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**PART I**  
*Bioventing Pilot Test Work Plan for*  
**PS-2, PS-1A, PS-1B,**  
**BUILDING 2034, BUILDING 2035**  
**Fairchild Air Force Base, Washington**

**PART II**  
*Draft Bioventing Pilot Test Interim Results Report for*  
**PS-2, PS-1A, PS-1B,**  
**BUILDING 2034, BUILDING 2035**  
**Fairchild Air Force Base, Washington**

**VOLUME 2 OF 2**

*Prepared for*  
**Air Force Center for Environmental Excellence**  
**Brooks AFB, Texas**  
**and**  
**Fairchild Air Force Base, Washington**

**June 1994**

*Prepared by*  
**ENGINEERING-SCIENCE, INC.**  
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*AQM01-04-0635*

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**APPENDIX A**  
**GEOLOGIC BORING LOGS**

BORING LOG		Boring/Well No.: VW-1		1 of 1					
Installation: FAIRCHILD AFB		Site: NS 2		Project No: DE 268					
Client/Project: AFCEE		Contractor: ENGINEERING - SCIENCE							
Drilling Contractor: ENV WEST		Drillers: RICK McCOCKLE & TED MAN							
Drilling Started: ( ) 9-22-93		Drilling Ended: ( ) 9-23-93		OSHA Protection Level: D					
Drilling Method: AUGER		Sampling Method: SHUT SPECIM		Borehole dia (s): 11'					
Geologist: S THOMAS TAYLOR		Borehole Coordinates:		LS Altitude:					
DEPTH (feet)	RECOVERY (%)	HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA
		Amount (ppm)	Interval (feet)	No.	Interval (feet)				
5		1500	0-2.0			0-2' GRAVELLY SAND, GRAY NS-NG, VERY POORLY SORTED, ANGULAR, LOOSE UNCONSOLIDATED DAMP, FUEL ODOR, PROBABLY FILL MATERIAL			
		5700	2.0-2.5			2'-2.5' SAND, DARK GREENISH-GRAY, WELL SORTED, MICACEOUS, DAMP, WELL ROUNDED, LOOSE-UNCONSOLIDATED, FUEL ODOR			
		5800	2.5-3.0			2.5-3.0 SAND AS ABOVE WITH PEBBLY GRAVEL			
		5900	3.0-4.0			3.0-4.0 AS ABOVE SAND & GRAVEL, MINOR CLAY			
		3100	6.0-6.5			6.0-8.0 SAND AND GRAVEL, SILTY, MINOR CLAY, DARK BROWN, POORLY ROUNDED, POORLY SORTED, DAMP FUEL ODOR, UNCONSOLIDATED			
10		984		PS-2-					
		3600	7.0-7.5	VW1-	7.5	7.5-8.4"			
		1091				8.4-9.6"			
						9.6-10.2"			
						8.0-9.0 SAND AND SILT, VERY FINE GRAINED SAND, MINOR CLAY, DARK BROWN, WELL ROUNDED, WELL SORTED, DAMP WET, FUEL ODOR, UNCONSOLIDATED BUT COHESIVE			

BORING LOG		Boring/Well No.: VMP-1	Page 1 of 1							
Installation: FAIRCHILD AFB		Site: PS-2	Project No: DEZL9							
Client/Project: AFCEE		Contractor: ENGINEERING--SCIENCE								
Drilling Contractor: ENV WEST		Drillers: RICK MCCORMACK & TED MAY								
Drilling Started: () 9-23-93		Drilling Ended: () 9-23-93	OSHA Protection Level: D							
Drilling Method: AUGER		Sampling Method: SPIT SPOON	Borehole dia (s): 8"							
Geologist: S. THOMAS TAYLER		Borehole Coordinates:		LS Altitude:						
DEPTH (feet)	RECOVERY (%)	HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA	
		Amount (ppm)	Interval (feet)	No.	Interval (feet)					
0 - 10		2600 1062	0-6"			0.0-2.0 GRAVELLY SAND, GRAY (NS-NH), VERY POORLY SORTED, ANGULAR, LOOSE-UNCONSOLIDATED, DAMP, FUEL ODOR, PROBABLY FILL MATERIAL. 2.0-2.5 SILT WITH VERY FINE-GRAINED SAND, BROWNISH-BLACK, WELL-SORTED, DAMP, FUEL ODOR, FIRM. 2.5-3.3 SAND, GREENISH GRAY, FINE-GRAINED, MINOR SILT, MOD. SORTING, MOD. ROUGHENED, DAMP, FUEL ODOR. 3.3-5.5 SILTY SAND, SAND IS VERY FINEGRAINED, DARK BROWN, POORLY SORTED, POORLY ROUNDED, OCCASIONAL PEBBLES, DAMP, FUEL ODOR, UNCONSOLIDATED. 5.5-7.0 AS ABOVE BUT AVERAGE GRAIN SIZE INCREASING DOWNWARD. 7.0-8.0 NOT RECOVERED. 8.0-8.6 SILT AND CLAY, DARK BROWN, POSSIBLY ORGANIC RICH, WET, FIRM, FUEL ODOR. 8.6-9.0 SAND, GRAY, COARSE GRAINED, WELL SORTED, POORLY ROUNDED, WET, FUEL ODOR, UNCONSOLIDATED.			18 40 50 49 19 10  X 8 13 19 7 26 40 15  N 14 30 30	← 35" DIA. RECORDAL
10 - 30		3900 1026	72-78"							
		4200 1304	96-102							

BORING LOG		Boring/Well No.: VMP-2		1 of 1					
Installation: FAIRCHILD AFB			Site: PS-2		Project No: DE 268				
Client/Project: AFCEE			Contractor: ENGINEERING - SCIENCE						
Drilling Contractor: ENVI. WEST			Drillers: RICK MCCORKLE & TED MAY						
Drilling Started: ( ) 9-24-93		Drilling Ended: ( ) 9-24-93		OSHA Protection Level: D					
Drilling Method: AUGER		Sampling Method: SPIT SPOONS		Borehole dia (s): 8"					
Geologist: S. THOMAS TAYLOR		Borehole Coordinates:		LS Altitude:					
DEPTH (feet)	RECOVERY (%)	HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA
		Amount (ppm)	Interval (feet)	No.	Interval (feet)				
5		2700 689	0-0.5			0-2" GRAVEL, GRAY, POORLY SORTED, ANGULAR, DAMP FUEL ODOR, UNCONSOLIDATED. 6-2" SAND, GRAY, MOD SORTING, MOD. RND., DAMP, FUEL ODOR UNCONSOLIDATED. WITH PERCENTAGE OF SILT INCREASING DOWNWARD.		24	
		10000 924	2.0-2.5			2-4" SAND, SILTY, DARK BROWN, FINEGRAINED, MOD. ROUNDED, MOD. SORTING, DAMP, FUEL ODOR, UNCONSOLIDATED SOME GRAVEL IN BOTTOM SIX INCHES (42-48").		26	
		8300 1155	4.0-4.5	PS2- VMP2- 4	4.5-6.0	4-6" AS ABOVE WITH GRAIN SIZE DECREASING DOWNWARD, FUEL ODOR		26	
		2500 987	6.0-6.1			6-7 1/2" VERY FINE GRAINED SAND AND SILT, ROUNDED, MODERATE TO GOOD SORTING, DAMP, UNCONSOLIDATED FUEL ODOR. OCCASIONAL PEBBLES AND COBBLES		15 37	
10						T.D. 7'2"		50 2"	

BORING LOG		Boring/Well No.: VMP-3		1 of 1					
Installation: FAIRCHILD AFB			Site: PS-2		Project No: DCZ68				
Client/Project: AFCEE			Contractor: ENGINEERING-SCIENCE						
Drilling Contractor: ENV. WEST			Drillers: RICK MCCORLE & TED MAY						
Drilling Started: 09-28-93		Drilling Ended: 09-28-93		OSHA Protection Level:					
Drilling Method: AUGER		Sampling Method: SPAT SPOON		Borehole dia (a): 8"					
Geologist: S. THOMAS TAYLOR		Borehole Coordinates:		LS Altitude:					
DEPTH (feet)	RECOVERY (%)	HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA
		Amount (gpm)	Interval (feet)	No.	Interval (feet)				
		1100	0-0.5			0-1' SAND, GRAY-GREEN COARSE GRAINED, MINOR SILT, POORLY ROUNDED, POORLY SORTED, DAMP, FUEL ODOR, UNCONSOLIDATED PROBABLY FILL, GRAVEL ALSO IN SAMPLE		17	
		6200	2.0-2.5			1-2' NO RECOVERY		21	
		10000+	3.0-3.5			2-4' SAND AND SILT, COARSE GRAINED, VERY POORLY SORTED, OCCASIONAL PEBBLES, POORLY ROUNDED, DAMP, FUEL ODOR, UNCONSOLIDATED		22	
		10000+	4.5-5.0			4-6' SAND AND SILT AS ABOVE WITH 6" THICK LENS OF CLEAN SAND AT 5'		23	
		2900	5.5-6.0			6-8' SILTY SAND AS ABOVE WITH SILT INCREASING DOWNWARD, FUEL ODOR (SLIGHTLY LESS STRONG THAN ABOVE).		24	
		2700	6.5-7.0					25	
		1150	7.5-8.0					26	

DEPTH (feet)		RECOVERY (%)		HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA
Amount (gpm)	Interval (feet)	No.	Interval (feet)								
0-12"								0-12" SILTY SAND, MINOR GRAVEL AND CLAY, POOR SORTED, POOR ROUNDING, DAMP, UNCONSOLIDATED.			
12-24"								12-24" SILTY SAND, DARK BROWN, MINOR COARSE SAND AND CLAY, MOD. ROUNDED POOR SORTING, DAMP, FUEL ODOR, UNCONSOLIDATED.			
24-30"								24-30 NR.			
30-42"								30-42 AS ABOVE			
42-54"								42-54 SAND MINOR SILT, OLIVE GREEN-BROWN, MEDIUM GRAINED SAND BUT SAND GRAIN SIZE INCREASING TO COARSE GRAIN, MOD. ROUNDED, POOR SORTING, DAMP, FUEL ODOR, UNCONSOLIDATED.			
54-72"								54-72 SAND, GREENISH GRAY, WELL SORTED, MOD. ROUNDED, DAMP, FUEL ODOR, UNCONSOLIDATED, MED. GRAIN SIZE.			
72-96"								72-96" SAND AS ABOVE, WRT AT 7'			
								PSIA-VMP4-7 IS DUPLICATE SAMPLE FOR BTEX AND TRPH			

Boring Log		Boring/Well No.: VMP-1A RENAMED VMP-1		1 of 1	
Installation: FAIRCHILD AFB		Site: PS-1A		Project No:	
Client/Project: AFCEE		Contractor: ENGINEERING-SCIENCE			
Drilling Contractor: ENV. WEST		Drillers: RICK McCORKLE & TED MAY			
Drilling Started: ( ) 10-14-93		Drilling Ended: ( ) 10-14-93		OSHA Protection Level: Δ	
Drilling Method: AUGER		Sampling Method: SPLIT SPOON		Borehole dia (a): 11"	
Geologist: S. THOMAS TAYLOR		Borehole Coordinates:		LS Altitude:	

DEPTH (feet)	RECOVERY (%)	HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA
		Amount (gpm)	Interval (feet)	No.	Interval (feet)				
						8" CONCRETE			
520 872			6-12"			0-6" NO RECOVERY 6"-12" SILTY SAND, MINOR CLAY, DARK BROWN-BLACK, V. FINE GRAINED, MOD. ROUNDING, MOD. SORTING, DAMP, UNCONSOLIDATED, OCC. PEBBLES.		12	
1900 827			30-36"			12-24" AS ABOVE		15	
2400 834			48-54"			30-36" SILTY SAND, DARK BROWN-BLACK, VERY FINE GRAINED, MOD. ROUNDING, POOR SORTING, COMMON COARSE SAND, DAMP UNCONSOLIDATED, OCC. PEBBLES.		16	
4500 1446			72-78"			36-48" SAND, MINOR SILT, OLIVE-GREEN-GRAY, MEDIUM GRAINED SAND, MOD. ROUNDING, MOD. SORTING, DAMP, FUEL ODOR UNCONSOLIDATED.		2	
						48-54" SAND, MINOR SILT, OLIVE-BROWN, MOD. ROUNDING, GOOD SORTING, DAMP, UNCONSOLIDATED, FUEL ODOR		3	
						54-72" AS ABOVE		4	
						72-78" SAND, MINOR SILT, OLIVE-BROWN, MOD. ROUNDING, OCC. ANG. COARSE CLASTS, DOMINANTLY MED. GRAINED SAND, DAMP, STRONG FUEL ODOR, UNCONSOLIDATED, LOOSE.		5	
						78-96 SAND AS ABOVE, BUT DARK GRAY AND WET		7	







Boring Log		Boring/Well No.: VMP-3	Page 1 of 1						
Installation: FAIRCHILD - AFB		Site: PS-1A	Project No: DE268						
Client/Project: AFCEE		Contractor: ENGINEERING - SCIENCE							
Drilling Contractor: ENV. WEST		Drillers: RICK MCCORMLE & TED MAY							
Drilling Started: 0 10-13-93		Drilling Ended: 0 10-13-93	OSHA Protection Level: D						
Drilling Method: Auger		Sampling Method: SPWT SPOON	Borehole dia (s): 8"						
Geologist: S. THOMAS TAYLOR		Borehole Coordinates:		LS Altitude:					
DEPTH (feet)	RECOVERY (%)	HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA
		Amount (gpm)	Interval (feet)	No.	Interval (feet)				
		8 NA	0-12"			0-6" NO RECOVERY 6-12" SILTY SAND, MINOR GRAVEL DARK BROWN, FINE GRAINED WITH OCCASIONAL GRAVEL, POOR SORTING, MOD. GOOD ROUNDING, DRY, UNCONSOLIDATED			
		1500 NA	30-36"			12-24" SILTY SAND AND GRAVEL, DARK BROWN, FINE GRAINED WITH ABUNDANT GRAVEL, POOR SORTING, MOD. GOOD ROUNDING, DAMP, UNCONSOLIDATED			
		9700 NA	54-60"	PSIA-VMP3-	60-66"	24-30" NO RECOVERY 30-36" GRAVEL, GRAY, MINOR COARSE SAND, MOD. GOOD ROUNDING, GOOD SORTING,			
		2400 NA	72-78"	6	66-72" 78-84"	DAMP, LOOSE, UNCONSOLIDATED. 36-42 AS ABOVE 42-48 SILTY SAND, DARK BROWN, FINE TO COARSE GRAINED SAND, MOD. GOOD ROUNDING, MOD. SORTING, DAMP, UNCONSOLIDATED 48-54 - NO RECOVERY 54-60" CLAYEY SILT, BROWNISH-BLACK, MINOR SAND, MEDIUM TO COARSE GRAINED, MOD. ROUNDING, VERY POOR SORTING, WET, FUEL OIL, UNCONSO.			
						60-72" AS ABOVE 72-78" SILTY SAND WITH CLAY, DARK BROWN, SAND IS VERY FINE GRAINED WITH OCC. COARSE SAND, VERY POORLY SORTED, MOD. ROUNDING, DAMP, UNCONSOLIDATED. 78-84 - AS ABOVE 84-90 - SAND, OLIVE GREEN-GRAY, MED. GRAINED, GOOD SORTING, MOD. GOOD ROUNDING, WET, LOOSE-UNCONSOLIDATED. 90-96 CLAY, BROWN, WET, FIRM BUT UNCONSO.			

<b>BORING LOG</b>		Boring/Well No.: <u>VW-1</u>		1 of 1	
Installation: <u>FAIRCHILD AFB</u>		Site: <u>PS-1B</u>		Project No: <u>DE268</u>	
Client/Project: <u>AFCEE</u>		Contractor: <u>ENGINEERING - SCIENCE</u>			
Drilling Contractor: <u>ENV. WEST</u>		Drillers: <u>RICK McCORKLE &amp; BILL FELDER</u>			
Drilling Started: <u>10-20-93</u>		Drilling Ended: <u>10-20-93</u>		OSHA Protection Level: <u>D</u>	
Drilling Method: <u>AUGER</u>		Sampling Method: <u>SPLIT SPOON</u>		Borehole dia (s): <u>11"</u>	
Geologist: <u>S. THOMAS TAYLOR</u>		Borehole Coordinates:			LS Altitude: <u>12</u>

DEPTH (feet)	RECOVERY (%)	HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA
		Amount (cc)	Interval (feet)	No.	Interval (feet)				
						8" CONCRETE			
0-6						0-6" NO RECOVERY		15	
6-12		23	6-12"			6-12" SILTY SAND AND GRAVEL, DARK BROWN, POOR ROUNDING, POOR SORTING, DAMP, UNCONSOLIDATED.		10	
12-18		72	24-30"			12-18" AS ABOVE		5	
18-24						18-24" SILTY SAND, MINOR CLAY, OCC. PEBBLES, DARK BROWN, DOMINANTLY FINE SAND WITH COMMON COARSE GRAINS, MOD. ROUNDED, POOR SORTED, DAMP, UNCONSOLIDATED.		10	
24-48		460	54-60	PS1B-6	60-66	24-48" AS ABOVE		5	
48-54					66-72	48-54 NO RECOVERY		5	
54-66		8100	78-84	VW1-6	72-78	54-66" SILTY SAND, AS ABOVE		3	
66-80						66-80" SAND, MINOR SILT, GRAY, SAND IS FINE AND MEDIUM GRAINED, MOD. ROUNDED, MOD. SORTED, (MINOR TO TRACE CLAY), WET, STRONG FUEL ODOR, UNCONSOL.		7	
80-96						80-96" CLAY AND SAND, WITH SILT, GRAY, SAND IS FINE TO COARSE SIZE, MOD. ROUNDED, POOR SORTED, WET, FUEL ODOR, FIRM BUT UNCONSOLIDATED.		12	

<b>BORING LOG</b>		Boring/Wall No.: <u>VMP-1</u>		1 of 1	
Installation: <u>FAIRCHILD AFB</u>		Site: <u>PS-18</u>		Project No: <u>DEZ68</u>	
Client/Project: <u>AFCEE</u>		Contractor: <u>ENGINEERING - SCIENCE</u>			
Drilling Contractor: <u>ENV. WEST</u>		Drillers: <u>RICK McCORKLE &amp; TED MAY</u>			
Drilling Started: ( ) <u>10-21-93</u>		Drilling Ended: ( )		OSHA Protection Level: <u>D</u>	
Drilling Method: <u>AUGER</u>		Sampling Method: <u>SPLIT SPOON</u>		Borehole dia (s): <u>8"</u>	
Geologist: <u>S. THOMAS TAYLOR</u>		Borehole Coordinates:		LS Altitude:	

DEPTH (feet)	RECOVERY (%)	HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA
		Amount (lbs)	Interval (feet)	No.	Interval (feet)				
						8" CONCRETE			
0-6"			6-12			0-6" NO RECOVERY 6"-24" SILTY SAND, MINOR CLAY, MINOR GRAVEL, DARK BROWN-BLACK, MOD. ROUNDED, MOD. SORTED, DAMP, FUEL ODOR, UNCONSOLIDATED.		14	
6-12"		1200	12-18					12	
12-18"		4600	18-24			24-30" NO RECOVERY		7	
18-24"		930	30-36			30-36" SILTY SAND, DARK BROWN-BLACK, VERY FINE GRAINED, MOD. SORTED, MOD. ROUNDED, DAMP, FUEL ODOR, UNCONSOLIDATED		7	
24-30"		540	48-54	PS18-VMP-5.5	54-60	36-48" AS ABOVE		2	
30-36"					60-66	48-54" SILTY SAND WITH CLAY, DARK BROWN-GRAY, SAND IS VERY FINE GRAINED, MOD. ROUNDED, MOD. TO POORLY SORTED, DAMP, FUEL ODOR, UNCONSOLIDATED.		5	
36-48"					66-72	54-60" AS ABOVE		6	
48-54"		1000	72-78			60-72" SAND, MINOR SILT, DARK GRAY, MED. TO COARSE GRAINED, MOD. SORTING, MOD. ROUNDED, WET AT BOTTOM OF INTERVAL.		3	
54-60"		500	78-84					5	
60-66"		360	84-90			72-78- SAND, MINOR SILT, DARK GRAY-BLACK, MED. TO COARSE GRAIN, MOD. WELL SORTED, MOD. ROUNDED, WET, FUEL ODOR, UNCONSOL. - LOOSE.		8	
66-72"		150	90-96			78-84 AS ABOVE		TO 8'	
72-78"						84-90 SAND AS ABOVE BUT COARSE GRAIN SIZE DOMINANT			
78-84"						90-92 SAND AS ABOVE			
84-90"						92-96 CLAY, GRAY, WET, FIRM BUT UNCONSOLIDATED			
90-96"						60" - SAND			

<b>BORING LOG</b>		Boring/Well No.: <b>VMP-2</b>		1 of 1	
Installation: <b>FAIRCHILD AFB</b>			Site: <b>PS-1B</b>		Project No: <b>DE268</b>
Client/Project: <b>AFCEE</b>			Contractor: <b>ENGINEERING - SCIENCE</b>		
Drilling Contractor: <b>ENV. WEST</b>			Drillers: <b>RICK MCCORKLE &amp; GAIL FELDER</b>		
Drilling Started: <b>0 10-20-93</b>		Drilling Ended: <b>0 10-20-93</b>		OSHA Protection Level:	
Drilling Method: <b>AUGER</b>		Sampling Method: <b>SPLIT SPOON</b>		Borehole dia (s): <b>8"</b>	
Geologist: <b>S. THOMAS TAYLOR</b>		Borehole Coordinates:		LS Altitude:	

DEPTH (feet)	RECOVERY (%)	HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA
		Amount (gals)	Interval (feet)	No.	Interval (feet)				
0		270	0-6			0-6" SILTY SAND AND GRAVEL, DARK BROWN, SAND IS DOMINANTLY FINE GRAINED, COMMON COARSE GRAINS, COMMON TO MINOR PEBBLES, VERY POORLY SORTED, MOD. ROUNDED, DAMP, UNCONSOLIDATED.		7	
5		445	6-12			6-12" AS ABOVE		10	
10		4400	24-30			12-30 SILTY SAND, MINOR GRAVEL, DARK BROWN, SAND IS DOMINANTLY FINE GRAINED, COMMON COARSE GRAINS, TRACE PEBBLE SIZE GRAVEL, MOD. ROUNDING, POOR SORTING, DAMP, - FUEL ODOR, UNCONSOLIDATED		16	
15		4800	48-54			30-66" SILTY SAND, DARK BROWN-BLACK, SAND IS VERY FINE GRAINED, DAMP, UNCONSOLIDATED, STRONG FUEL ODOR.		3	
20		10000	77-78"			66-96" SAND, TRACK SILT AND CLAY, GRAY, MEDIUM GRAIN SAND, POOR TO MOD. ROUNDED, GOOD SORTING, WET BELOW 6 FEET, STRONG FUEL ODOR, UNCONSOLIDATED.		2	
25								3	
30								18	
								15	
								15	

WATER AT 75.5" BGS IN MW 208, THIS LOCATION IS APPROXIMATELY 1' HIGHER THAN WELL  
SAND STARTS AT 66"

<b>BORING LOG</b>		Boring/Well No.: <b>VMP-3</b>		1 of 1	
Installation: <b>FAIRCHILD AFB</b>			Site: <b>PS-1B</b>	Project No: <b>DE 268</b>	
Client/Project: <b>AFCEE</b>			Contractor: <b>ENGINEERING-SCIENCE</b>		
Drilling Contractor: <b>ENV. WEST</b>			Drillers: <b>ALAN MCCORMICK &amp; TED MAY</b>		
Drilling Started: <b>( ) 10-22-93</b>		Drilling Ended: <b>( ) 10-22-93</b>		OSHA Protection Level: <b>Δ</b>	
Drilling Method: <b>"AUGER"</b>		Sampling Method: <b>SPLIT SPOON</b>		Borehole dia (s): <b>8"</b>	
Geologist: <b>W. THOMAS TAYLOR</b>		Borehole Coordinates:		LS Altitude:	

DEPTH (feet)	RECOVERY (%)	HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA
		Amount (gals)	Interval (feet)	No.	Interval (feet)				
0-2	95.7	8	0-6			0-6" SILTY SAND, MINOR CLAY, MINOR GRAVEL, DARK GREEN MOD. ROUNDED, POOR SORTED, DAMP, UNCONSOLIDATED, FUEL ODOR		8	
2-4	0.03	10	6-12			6-24" AS ABOVE		10	
4-6	0.10	1000	12-24			24-48" AS ABOVE		7	
6-8	10.18	3900	30-36			48-50" AS ABOVE		96	
8-10		10000	42-48					6	
10-12		10000	54-60			50"-90" SAND, GRAY, MEDIUM GRAINED SAND, MINOR SILT, MOD. ROUNDED, MOD-GOOD SORTING, DAMP, STRONG FUEL ODOR, LOOSE-UNCONSOLIDATED.		10	
12-14		10000	60-66					65	
14-16		10000	66-72					5	
16-18		10000	72-78					5	
18-20		10000	78-84					5	
20-22		10000	84-90			90-96" SANDY CLAY, GRAY, WET, FIRM BUT UNCONSOLIDATED, SAND IS COARSE GRAINED AND SMALLER, ANOMALY TO SLIGHTLY ROUNDED, VERY POOR SORTING. FUEL ODOR.		12	
22-24		3400	90-96						

<b>BORING LOG</b>		Boring/Well No.: <b>VW-1</b>		1 of 1	
Installation: <b>FAIRCHILD AFB</b>			Site: <b>2034</b>		Project No: <b>DE268</b>
Client/Project: <b>AFCEE</b>			Contractor: <b>ENGINEERING - SCIENCE</b>		
Drilling Contractor: <b>ENV. WEST</b>			Drillers: <b>RICK MCCORMACK &amp; TED MAY</b>		
Drilling Started: <b>0 9/30/93</b>		Drilling Ended: <b>0 9/30/93</b>		OSHA Protection Level: <b>D</b>	
Drilling Method: <b>AUGER</b>		Sampling Method: <b>SPLIT SPOON</b>		Borehole dia (s): <b>11"</b>	
Geologist: <b>S. THOMAS TAYLOR</b>			Borehole Coordinates:		LS Altitude:

DEPTH (feet)	RECOVERY (%)	HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA
		Amount (lbs)	Interval (feet)	No.	Interval (feet)				
0-2 11:51		0	0-4"			0-6" SAND AND GRAVEL, BROWN, MOD. ROUNDING, POOR SORTING, DRY, UNCONSOLIDATED, 6-12" SAND AND GRAVEL, BROWN POOR ROUNDING, POOR SORTING, DAMP, UNCONSOLIDATED.		12	
-4 11:56		2.5	30-36"			12-24" NO RECOVERY 24-30" NO RECOVERY		14	
4-6 12:04		2900 778	48-54"	B2034- VW1- 5.5	54-60	30-36" SILTY SAND, DARK BROWN, MOD. ROUNDING, MOD. SORTING, DAMP, UNCONSOLIDATED.		15	
6-8 12:11		1000 419	78-84"		60-66	36-48" SILTY SAND, OCC. GRAVEL, BROWN, POOR ROUNDING, VERY POOR SORTING, DAMP, UNCONSOLIDATED.		3	
8-10 1:17		740 303	96-102"		66-72	48-54" SILTY FINE GRAINED SAND, DARK BROWN, GOOD SORTING, GOOD ROUNDING, DAMP, SLIGHT FUEL ODOR, UNCONSOLIDATED		10	
						54-72" AS ABOVE.		15	
						72-78" NO RECOVERY		5	
						78"-84" SILTY SAND, BROWNISH-BLACK, MINOR CLAY, CONCRETE MOD. SORTING, MOD. ROUNDING, DAMP, FUEL ODOR.		5	
						84"-96" SILTY SAND, BROWN, POOR ROUNDING, POOR SORTING, DAMP, FUEL ODOR, UNCONSOLIDATED, OCC. GRAVEL.		6	
						96-102" SILTY SAND, SAND IS FINE GRAINED, POORLY SORTED, MOD. ROUNDING, FUEL ODOR, WET, UNCONSOLIDATED.		15	
						102-108" SAND MINOR SILT, BROWN-BLACK, MOD. SORTING, MOD. ROUNDING, DAMP, FUEL ODOR.			
						108-116" AS ABOVE			
						116-120" CLAY, LIGHT BROWN, WET, FIRM.			



Installation: FAIRCHILD AFB	Site: 2034	Project No: DE 268
Client/Project: AFCEE	Contractor: ENGINEERING SCIENCE	
Drilling Contractor: ENV. WEST	Drillers: RICK Mc	TED MAY
Drilling Started: () 10-1-93	Drilling Ended: () 10-1-93	HA Protection Level: D
Drilling Method: AUGER	Sampling Method: SPLIT SPOC	hole dia (s): 8"
Geologist: S. THOMAS TAYLOR	Borehole Coordinates:	LS Altitude:

DEPTH (feet)	RECOVERY (%)	HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA
		Amount (ppm)	Interval (feet)	No.	Interval (feet)				
0-2		21	6-12"			0-6" NO RECOVERY 6-12" SILTY SAND, DARK BROWN, MOD. ROUNDING, MOD SORTING, DRY UNCONSOLIDATED.			
10.11		17	30-36"			12-18" SILTY SAND WITH CLAY, DARK BROWN, POOR. ROUNDED, POOR SORTING, DAMP, UNCONSOLIDATED.			
10.56		142	48-54"			18-24" SILTY SAND, MINOR CLAY, AS ABOVE, SLIGHT FUEL ODOR			
10.75		2500				24-30" NO RECOVERY			
4-6		1330				30-36" SILTY SAND WITH CLAY, AS ABOVE, OCC. PEBBLE			
10.21						36-42" SILTY SAND WITH CLAY, GREENISH BROWN-BLACK, OCC. PEBBLES, POORLY SORTED, POORLY ROUNDED, DAMP, FUEL ODOR UNCONSOLIDATED.			
10.42		7000	78-84"			42-48" AS ABOVE WITH COBBLE			
6-8		2087				48-54" AS ABOVE WITH ANGULAR BASALT FRAGMENTS.			
10.30						54-60" AS ABOVE			
10.50		2400	108-114"			60-66" SILTY SAND WITH CLAY, SAND IS VERY COARSE, OCC. PEBBLES, POORLY SORTED, MOD. ROUNDED, DAMP, FUEL ODOR, UNCONSOLIDATED.			
7-10		1333				66-72" AS ABOVE			
10.56						72-78" NO RECOVERY			
						78-96" AS ABOVE, SILTY SAND.			
						96-108" NO RECOVERY			
						108-114" SAND, MINOR SILT, WELL SORTED, MOD. ROUNDED, DAMP FUEL ODOR, UNCONSC., GREENISH DARK BROWN-BLACK			
						114-120" AS ABOVE FUEL ODOR			
						(108-120" IS PROBABY TANK BASE SAND USED FOR FILL INTO TANK PIT).			

BORING LOG		Boring/Well No.: VMP-2		1 of 1					
Installation: FAIRCHILD AFB		Site: 2034		Project No:					
Client/Project: AFCEE		Contractor: ENGINEERING - SCIENCE							
Drilling Contractor: ENV. WEST		Drillers: RICK MCCORKLE & TED MAY							
Drilling Started: (I) 9/30/93		Drilling Ended: (I) 9/30/93		OSHA Protection Level: D					
Drilling Method: AUGER		Sampling Method: SPLIT SPOON		Borehole dia (s): 8"					
Geologist: S. THOMAS TAYLOR		Borehole Coordinates:		LS Altitude:					
DEPTH (feet)	RECOVERY (%)	HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA
		Amount (gpm)	Interval (feet)	No.	Interval (feet)				
0-2 3:31		4 19	6-12"			0-6" NO RECOVERY 6-12" SAND AND GRAVEL, MINOR SILT, DARK BROWN, POOR SORTING, POOR ROUNDING, DRY, UNCONSOL.			
2-4 3:35		4 21	30-36"			12-24" SILTY SAND, BROWN, MOD. ROUNDING, MOD. SORTING, DAMP, UNCONSOLIDATED.			
4-6 3:39		1400 713	48-54"			24-30" NO RECOVERY.			
6-8 3:45		2450 1571	72-78"	B2034 -VMP2	78-84"	30-36" SILTY SAND, MINOR CLAY, DARK BROWN, MOD. SORTING, MOD. ROUNDING, DAMP, SLIGHT FUEL ODOR, UNCONSOLIDATED.			
8-10 3:49		2900 1171	96-102"	-7	84-90" 90-96"	36-48" SILTY SAND, BROWN, MOD. ROUNDING, MOD. SORTING, DAMP UNCONSOLIDATED.			
						48-54" SILTY SAND, MINOR CLAY, DAMP, FUEL ODOR, MOD. SORTING, MOD. ROUNDING, UNCONSOLIDATED.			
						54-60" AS ABOVE, STAINED BLACK?, STRONG FUEL ODOR			
						60-66" SILT WITH CLAY AND SAND, DARK BROWN, POOR SORTING, MOD. ROUNDING, DAMP, FUEL ODOR, UNCONSOL.			
						66-72" SILT AND SAND, WITH CLAY, DARK BROWN, POOR SORTING, MOD. ROUNDING, DAMP, FUEL ODOR, UNCONSOL.			
						72-78" SILTY SAND, SOME CLAY, DARK BROWNISH BLACK, POOR SORTING, POOR ROUNDING, DAMP (ALMOST WET), FUEL ODOR, UNCONSOLIDATED.			
						78-96" AS ABOVE			
						96-102" SILTY SAND, MINOR CLAY, DARK BROWN, POOR SORTING, POOR ROUNDING, WET, FUEL ODOR, UNCONSOL.			
						102-105" AS ABOVE			
						105-108" CLEAN SAND, DARK BROWN, MOD-GOOD SORTING, MOD. ROUNDING, WET, FUEL ODOR, UNCONSOLIDATED.			
						108-117" AS ABOVE			
						9'-9" TO 10' CLAY, BROWN, DENSE, FIRM, WET.			





<b>BORING LOG</b>		Boring/Wall No.: <u>VMP-3</u>		1 of 1	
Installation: <u>FAIRCHILD AFB</u>			Site: <u>2034</u>	Project No: <u>DE 268</u>	
Client/Project: <u>AFCEE</u>			Contractor: <u>ENGINEERING - SCIENCE</u>		
Drilling Contractor: <u>ENV. WEST</u>			Drillers: <u>RICK MCCORMLE &amp; TED MAY</u>		
Drilling Started: ( ) <u>10-1-93</u>			Drilling Ended: ( )		OSHA Protection Level: <u>D</u>
Drilling Method: <u>AUGER</u>			Sampling Method: <u>SPLIT SPOON</u>		Borehole dia (s): <u>8"</u>
Geologist: <u>S. THOMAS TAYLOR</u>			Borehole Coordinates:		LS Altitude:

DEPTH (feet)	RECOVERY (%)	HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA
		Amount (gpm)	Interval (feet)	No.	Interval (feet)				
0-2		0	0-6"					17	
2-3		0	36-42"					26	
5		0						34	
10		6.0						42	
15								50	
20								58	
25								66	
30								74	
								82	
								90	
								98	
								106	
								114	
								122	
								130	
								138	
								146	
								154	
								162	
								170	
								178	
								186	
								194	
								202	
								210	
								218	
								226	
								234	
								242	
								250	
								258	
								266	
								274	
								282	
								290	
								298	
								306	
								314	
								322	
								330	
								338	
								346	
								354	
								362	
								370	
								378	
								386	
								394	
								402	
								410	
								418	
								426	
								434	
								442	
								450	
								458	
								466	
								474	
								482	
								490	
								498	
								506	
								514	
								522	
								530	
								538	
								546	
								554	
								562	
								570	
								578	
								586	
								594	
								602	
								610	
								618	
								626	
								634	
								642	
								650	
								658	
								666	
								674	
								682	
								690	
								698	
								706	
								714	
								722	
								730	
								738	
								746	
								754	
								762	
								770	
								778	
								786	
								794	
								802	
								810	
								818	
								826	
								834	
								842	
								850	
								858	
								866	
								874	
								882	
								890	
								898	
								906	
								914	
								922	
								930	
								938	
								946	
								954	
								962	
								970	
								978	
								986	
								994	
								1002	
								1010	
								1018	
								1026	
								1034	
								1042	
								1050	
								1058	
								1066	
								1074	
								1082	
								1090	
								1098	
								1106	
								1114	
								1122	
								1130	
								1138	
								1146	
								1154	
								1162	
								1170	
								1178	
								1186	
								1194	
								1202	
								1210	
								1218	
								1226	
								1234	
								1242	
								1250	
								1258	
								1266	
								1274	
								1282	
								1290	
								1298	
								1306	
								1314	
								1322	
								1330	
								1338	
								1346	
								1354	
								1362	
								1370	
								1378	
								1386	
								1394	
								1402	
								1410	
								1418	
								1426	
								1434	
								1442	
								1450	
								1458	
								1466	
								1474	
								1482	
								1490	
								1498	
								1506	
								1514	
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								1586	
								1594	
								1602	
								1610	
								1618	
								1626	
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								1642	
								1650	
								1658	
								1666	
								1674	
								1682	
								1690	
								1698	
								1706	
								1714	
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								1786	
								1794	
								1802	
								1810	
								1818	
								1826	
								1834	
								1842	
								1850	

DEPTH (feet)		RECOVERY (%)		HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA
				Amount (gpm)	Interval (feet)	No.	Interval (feet)				
0-6								NO RECOVERY			
6-12								SILTY SAND AND GRAVEL, BROWN, POOR ROUNDING, V. POOR SORTING, DAMP, UNCONSOLIDATED.			
12-24								NO RECOVERY.			
24-30								SILTY SAND, DARK BROWN, MINOR CLAY, DAMP, MOD. SORTING, MOD. TO GOOD ROUNDING, NO ODOR, UNCONSOL.			
30-48								SILTY SAND, MINOR CLAY, BROWN, MOD. ROUNDING, POOR SORTING (OC. PEBBLES), DAMP, UNCONSOLIDATED SLIGHT ODOR			
48-54								SILTY SAND, APPRECIABLE CLAY, DARK BROWN, POOR SORTING, MOD. ROUNDING, DAMP, FUEL ODOR, UNCONSOLIDATED			
54-60								AS ABOVE, STAINED BLACK?			
60-72								SILT SOME SAND, DARK BROWN, GOOD SORTING, MOD. ROUND, DAMP UNCONSOLIDATED.			
72-78								CLAYEY SILT, MINOR SAND, DARK BROWN, MOD SORTING, DAMP (ALMOST WET), FUEL ODOR, UNCONSOLIDATED.			
78-90								AS ABOVE			
90-96								SAND, DARK BROWN, GOOD SORTING, MOD. ROUNDING, DAMP, FUEL ODOR, UNCONSOLIDATED.			
96-102								SAND, OLIVE GREEN-GRAY, TRACE SILT, MOD. ROUNDED, GOOD SORTING, WET, FUEL ODOR, UNCONSOLIDATED			
102-108								AS ABOVE			
108-114								AS ABOVE			
114-116								SAND, AS ABOVE			
116-120								CLAY, BROWN, WET, UNCONSOLIDATED, FIRM.			

BORING LOG		Boring/Wall No.: V W-1		1 of 1					
Installation: FAIRCHILD AFB		Site: B2035		Project No: DE 268					
Client/Project: AFCEE		Contractor: ENGINEERING - SCIENCE							
Drilling Contractor: ENV. WEST		Drillers: RICK MCCORMLE & TED MAY							
Drilling Started: 10-4-93		Drilling Ended: 10-9-93		OSHA Protection Level: D					
Drilling Method: AUGER		Sampling Method: SPLIT SPOON		Borehole dia (s): 11"					
Geologist: S. THOMAS TAYLOR		Borehole Coordinates:		LS Altitude:					
DEPTH (feet)	RECOVERY (%)	HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA
		Amount (gpm)	Interval (feet)	No.	Interval (feet)				
0-6"			6-12			0-6" NO RECOVERY 6-12" SILTY SAND AND GRAVEL, BROWN POORLY SORTED, (OCC. GRAVEL), MOD. ROUNDED, DRY, UNCONSOLIDATED			
12-24"			36-42			12-24" SILTY SAND MINOR CLAY, BROWN, POOR SORTING, MOD. ROUNDED, DAMP UNCONSOLIDATED, OCC. GRAVEL.			
24-36"			54-60			24-36" NO RECOVERY. 36"-48" SILTY SAND AND GRAVEL, BROWN, MOD. ROUNDED, POORLY SORTED, (OCC. GRAVEL) DAMP, UNCONSOL.			
48-54"			72-78			48-54" NO RECOVERY 54-60" SILTY SAND, WITH CLAY, BROWN MOD. ROUNDED, POORLY SORTED, DAMP, COHESIVE BUT UNCONSOLIDATED.			
60-72"			84-90"	02035-VW1-8	84-90"	60-72" SILTY SAND, MINOR CLAY, GRAYISH DARK BROWN, POORLY SORTED, MOD. ROUNDED, DAMP, UNCONSOLIDATED.			
72-78"			96-102"		96-102"	72-78" SILTY SAND, BROWN, MOD. ROUNDED, V. POOR SORTING, OCC. COARSE SAND, DOMINANTLY FINE GRAINED SAND, MICA FRAGS, DAMP, UNCONSOLIDATED, OCC. PEBBLES.			
78-90"			108-114"		102-108"	78-90" AS ABOVE			
90-96"						90-96" SILTY SAND, BROWN, MOD. ROUNDED, POOR SORTING, OCC. CLAYEY LUMPS, DAMP, UNCONSOL., MICACEOUS.			
96-102"						96-102" CLAYEY SAND, GRAYISH BROWN, MOD. ROUNDED, POOR SORTING, FIRM, DAMP.			
102-108"						102-108" CLEAN SAND, GRAY, MOD. ROUNDED, GOOD SORTING, WET, UNCONSOLIDATED, FUEL ODOOR.			
108-114"						108-114" SILTY SAND, BROWN, MOD. ROUNDED, VERY POOR SORTING, OCC. PEBBLES OF ANGULAR BASALT, DAMP, UNCONSOL.			
114-123"						OCC. LUMPS OF BROWN CLAY.			
123-126"						114"-123" AS ABOVE			
						123-126" BROWN CLAY, WET, FIRM, UNCONSOLIDATED			

BORING LOG		Boring/Well No.: VMP-1		1 of 1					
Installation: FAIRCITILS AFB		Site: B2035		Project No: DR 268					
Client/Project: AFCEC		Contractor: ENGINEERING - SCIENCE							
Drilling Contractor: ENV. WEST		Drillers: RICK MCCORKLE & TED MAY							
Drilling Started: 0 10-4-93		Drilling Ended: 0 10-4-93		OSHA Protection Level: 0					
Drilling Method: AUGER		Sampling Method: SPAT SPOON		Borehole dia (s): 8"					
Geologist: S. THOMAS TAYLOR		Borehole Coordinates:		LS Altitude:					
DEPTH (feet)	RECOVERY (%)	HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA
		Amount (gpm)	Interval (feet)	No.	Interval (feet)				
0-6	0	6-12				0-6" NO RECOVERY. 6-12" SILTY SAND AND GRAVEL, BROWN, POOR ROUNDING, VERY POOR SORTING, DAMP, UNCONSOLIDATED.			
6-12	0	12-24				12-24" SILT AND SAND, COMMON GRAVEL, BROWN, POOR ROUNDING, POOR SORTING, DAMP, UNCONSOLIDATED.			
12-24	0	24-36				24-36" NO RECOVERY. 36-48" SILTY SAND, MINOR CLAY, TRACE GRAVEL, BROWN, MOD. ROUNDING, V. POOR SORTING, DAMP, UNCONSOLIDATED.			
24-36	0	36-48				36-48" SILT AND SAND, COMMON GRAVEL, BROWN, POOR ROUNDING, POOR SORTING, DAMP, UNCONSOLIDATED.			
36-48	0	48-60				48-60" NO RECOVERY. 60-72" SILTY SAND, SOME CLAY, BROWN, MOD. ROUNDING, V. POOR SORTING, (OCC. GRAVEL), DAMP, UNCONSOLIDATED.			
48-60	0	60-72				60-72" AS ABOVE.			
60-72	0	72-84				72-84" NO RECOVERY.			
72-84	0	84-96				84-96" CLAYEY SILT AND SAND, BROWNISH BLACK, POOR SORTING, MOD. ROUNDING, DAMP, COHESIVE, BUT UNCONSOLIDATED.			
84-96	0	96-108				96-108" AS ABOVE.			
108-120	0	108-120				108-120" SILTY SAND WITH CLAY, DARK BROWN, MOD. ROUNDING, MOD-POOR SORTING, DAMP, UNCONSOLIDATED. (BASALT COBBLE PHRASED SPOON AFTER 3" OF RECOVERY).			
120-120	0					120-120" NO RECOVERY			
						POSSIBLE FREE PRODUCT AT 9' TO 10'			
						5' Silty Sand w/clay			
						7.5' Clayey Silt w/sand			

BORING LOG		Boring/Well No.: VMP-3A RENAMED VMP-2		1 of 1					
Installation: FAIRCHILD AFB		Site: B2035		Project No: PE268					
Client/Project: AFCEE		Contractor: ENGINEERING - SCIENCE							
Drilling Contractor: ENV. WEST		Drillers: RICK MCCORKLE & TED MAY							
Drilling Started: (I) 10-6-93		Drilling Ended: (I) 10-6-93		OSHA Protection Level: Δ					
Drilling Method: AUGER		Sampling Method: SPLIT SPOON		Borehole dia (s): 8"					
Geologist: S. THOMAS TAYLOR		Borehole Coordinates:		LS Altitude:					
DEPTH (feet)	RECOVERY (%)	HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA
		Amount (gals)	Interval (feet)	No.	Interval (feet)				
0-6"	2/15		6-12"			0-6" NO RECOVERY 6-12": SILTY SAND AND GRAVEL, BROWN; POORLY SORTED, POOR ROUNDING, DRY UNCONSOLIDATED			
12-18"	7/15		30-36"			12-18": SILTY SAND WITH CLAY AND GRAVEL, BROWN, SAND IS VERY FINE GRAINED TO COARSE GRAINED, MOD. ROUNDED, VERY POOR SORTING, DAMP, UNCONSOLIDATED.			
18-24"	14/16		54-60"			18-24" AS ABOVE			
24-30"	38/16		72-78"	02035-UMPE-8.5	84-90-90-96-108-114	24-30" NO RECOVERY			
30-36"						30-36" SILTY SAND AND GRAVEL, MINOR CLAY, BROWN POORLY SORTED, POOR ROUNDING, DAMP, UNCONSOLIDATED.			
36-48"						36-48" AS ABOVE			
48-54"						48-54" NO RECOVERY			
54-60"						54-60" SILTY SAND, MINOR CLAY, BROWNISH BLACK POORLY SORTED, MOD. ROUNDED, DAMP, COHESIVE, BUT UNCONSOLIDATED			
60-66"						60-66" SILTY SAND, WITH CLAY, DARK BROWN, SAND IS VERY FINE GRAINED, POORLY SORTED, MOD. ROUNDED, DAMP, UNCONSOLIDATED, HUMIC DEBRIS, (PROBABLY FILL).			
66-72"						66-72" SILTY SAND WITH CLAY AND GRAVEL, DARK BROWN, SAND IS COARSE GRAINED, MOD. ROUNDED, VERY POORLY SORTED, GRAVEL IS UP TO SMALL COBBLE SIZED, DAMP, UNCONSOLIDATED.			
72-78"						72-78" SILTY SAND WITH CLAY, BROWNISH BLACK, POORLY SORTED, MOD. ROUNDED, OCC. ANGULAR GRAVEL, CLASTS, DAMP, SLIGHT HYDROCARBON ODOOR, COHESIVE BUT UNCONSOLIDATED.			
78-84"						78-84" - AS ABOVE			
84-96"						84-96" AS ABOVE			
96-102"						96-102" NO RECOVERY.			
102-108"						102-108" CLAYEY SILT AND SAND, GRAYISH BROWN VERY POORLY SORTED, OCC. GRAVEL CLASTS (ANGULAR), SAND IS MOD ROUNDED, DAMP, FUEL ODOOR, UNCONS. BUT COHESIVE			
108-120"						108-120" AS ABOVE.			



<b>BORING LOG</b>		Boring/Well No.: <b>VMP-2 - RENAMED VMP-3</b>		1 of 1	
Installation: <b>FAIRCHILD - AFB</b>			Site: <b>B 2035</b>		Project No: <b>DE 268</b>
Client/Project: <b>AFCEE</b>			Contractor: <b>ENGINEERING - SCIENCE</b>		
Drilling Contractor: <b>ENV. WEST</b>			Drillers: <b>RKK McCORMIE &amp; TED MAY</b>		
Drilling Started: (I) <b>10-5-93</b>		Drilling Ended: (I) <b>10-5-93</b>		OSHA Protection Level: <b>D</b>	
Drilling Method: <b>AUGER</b>		Sampling Method: <b>SPAT SPOON</b>		Borehole dia (s): <b>8"</b>	
Geologist: <b>S. THOMAS TAYLOR</b>		Borehole Coordinates:		LS Altitude: <b>"</b>	

DEPTH (feet)	RECOVERY (%)	HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA
		Amount (gpm)	Interval (feet)	No.	Interval (feet)				
10		8	18-24"			12-18" SILTY SAND, BROWN, MOD. SORTED, SAND IS VERY FINE GRAINED & COARSE, VERY POORLY SORTED, OCC. GRAVEL, DAMP, UNCONSOLIDATED.			
15		8	30-36"			24-30" NO RECOVERY			
20		8	36-42"			30-36" SILTY SAND, BROWN, DOMINANTLY VERY FINE SAND, MOD. ROUNDED, VERY POORLY SORTED, OCC. GRAVEL DAMP, UNCONSOLIDATED.			
25		8	54-60"			36-42" SAND WITH SILT AND CLAY, BROWN, DOMINANTLY COARSE SAND, OCC. GRAVEL, MOD. ROUNDED, VERY POORLY SORTED, DAMP, UNCONSOLIDATED.			
30		740 623	78-84"			42-48" AS ABOVE.			
35		2500 2217	102-108"			48-54" NO RECOVERY.			
40						54-60" SILTY SAND AND GRAVEL, BROWN, DOMINANTLY FINE GRAINED SAND, MINOR CLAY, MOD. ROUNDED, POORLY SORTED DAMP UNCONSOLIDATED.		3455	
45						60-72" SILTY SAND, BROWN, DOMINANTLY COARSE GRAINED SAND WITH MINOR CLAY, COMMON GRAVEL, POORLY SORTED, DAMP UNCONSOLIDATED.			
50						72-78" NO RECOVERY.			
55						78-84" SAND, BLACK, OCC. GRAVEL, MOD. SORTED, MOD. ROUNDED, DAMP, UNCONSOLIDATED, SLIGHT FUEL ODOR.			
60						84-96" AS ABOVE, STRONG FUEL ODOR.			
65						96-102" NO RECOVERY			
70						102-120" SAND, AS ABOVE			





<b>BORING LOG</b>		Boring/Well No.: PS-1 BUMP: PSI-VMPBZ		1 of 1	
Installation: FAIRCHILD AFB		Site: PS-1B		Project No: DE 268	
Client/Project: AFCEE		Contractor: ENGINEERING-SCIENCE			
Drilling Contractor: ENV. WEST		Drillers: DAN CHASSEN AND RON SINK			
Drilling Started: ( ) 10-23-93		Drilling Ended: ( ) 10-23-93		OSHA Protection Level: D	
Drilling Method: AUGER		Sampling Method: SPNT. SPOON		Borehole dia (s): 8"	
Geologist: S. THOMAS TAYLOR		Borehole Coordinates:		LS Altitude:	

DEPTH (feet)	RECOVERY (%)	HEAD SPACE		CHEMICAL SAMPLES		LITHOLOGIC DESCRIPTION	GRAPHIC LOG	USCS SOIL CLASSIFICATION	WELL LOG DATA
		Amount (gpm)	Interval (feet)	No.	Interval (feet)				
0-2						0-12" NO RECOVERY 12-24" SAND, BROWN, MEDIUM TO COARSE GRAINED, MINOR TO TRACE SAT. ANGULAR TO MOD. ROUNDED, MOD. WELL SORTED, DRY, LOOSE-UNCONSOLIDATED, MINOR PEBBLES		14	
8.02			12-18					14	
2-4			18-24					13	
8.08								10	
			36-42			24-36" NO RECOVERY		4	
			42-48			36-48" SAND AS ABOVE.		5	
						48-60" NO RECOVERY		4	
			60-66			60-72" SAND AS ABOVE		36	
			72-78			72-78" SAND AS ABOVE		6	
			78-84					11	
			84-90			78-96" SAND, DARK BROWN, MEDIUM TO COARSE GRAINED, WELL SORTED, MOD. WELL BOUNDED, DAMP LOOSE, UNCONSOLIDATED		17	
			90-96			TD = 96"		17	

**APPENDIX B**

**O&M MANUAL AND  
DATA COLLECTION SHEET**

# **GENERIC BIOVENTING BLOWER SYSTEM OPERATIONS AND MAINTENANCE MANUAL FOR EXTENDED PILOT TESTING**

Prepared For

**Air Force Center for Environmental Excellence  
Brooks AFB, Texas**

**USAF Contract F33615-90-D-4014 Delivery Order 14**

**ES**

**Engineering-Science, Inc.**

**April 1993**

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1700 BROADWAY, SUITE 900  
DENVER, COLORADO 80290

# GENERIC BLOWER SYSTEM OPERATIONS AND MAINTENANCE MANUAL FOR EXTENDED PILOT TESTING SYSTEM

Prepared for:  
AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE  
BROOKS AFB, TEXAS

USAF CONTRACT F33615-90-D-4010, DELIVERY ORDER 14

April 1993

Prepared by:  
Engineering-Science, Inc.  
1700 Broadway, Suite 900  
Denver, Colorado

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APPENDIX C Data Collection Sheets

## **SECTION 1**

### **INTRODUCTION**

This document has been prepared by Engineering-Science, Inc. to support the bioventing initiative contract awarded by the Air Force Center for Environmental Excellence. The contract involves the conducting of bioventing pilot tests at 35 sites on 23 Air Force bases across the United States.

At most sites, bioventing systems will be installed upon completion of the initial bioventing pilot tests for the purpose of extended pilot testing. These systems will operate for a 1-year period to provide further information as to the feasibility of the technology at each site, and to provide interim remedial action.

This Operations and Maintenance Manual has been created for sites at which regenerative or rotary-vane blowers have been installed for extended pilot testing. Basic maintenance of these systems is the responsibility of the Air Force facility. This manual is to be used by facility personnel to guide and assist them in operating and maintaining the blower system. Section 2 provides a summary of the bioventing system components installed. Section 3 of this document describes the blower system. Section 4 details the maintenance requirements and provides maintenance schedules. Section 5 describes the system monitoring that is required to forecast system maintenance needs and to provide data for the extended pilot test. Blower performance curves and relevant service information for regenerative and rotary-vane blowers are provided in Appendices A and B, respectively, and data collection sheets are provided in Appendix C.

## SECTION 2

### BLOWER SYSTEM CONFIGURATION SUMMARY

System Type (injection, extraction) \_\_\_\_\_  
Blower (regenerative, rotary vane) \_\_\_\_\_  
Blower Model \_\_\_\_\_  
Motor (Hp) \_\_\_\_\_  
Knock-Out Chamber (yes, no) \_\_\_\_\_  
Sampling Port (yes, no) \_\_\_\_\_  
Inlet Temperature Gauge (range) \_\_\_\_\_  
Inlet Pressure/Vacuum Gauge (range) \_\_\_\_\_  
Inlet Filter (part no.) \_\_\_\_\_  
Outlet Temperature Gauge (range) \_\_\_\_\_  
Outlet Pressure/Vacuum Gauge (range) \_\_\_\_\_  
Pressure/Vacuum Relief Valve Set @ (give unit of measure) \_\_\_\_\_

## SECTION 3

### BIOVENTING SYSTEM OPERATION

#### 3.1 PRINCIPLE OF OPERATION

Bioventing is the forced injection of fresh air, or withdrawal of soil gas, to enhance the supply of oxygen for *in situ* bioremediation. Either a pressure (air injection) or vacuum (vapor extraction) blower unit is used to inject or withdraw air into or from the soil, thereby supplying fresh air with 20.8 percent oxygen to the contaminated soils. Once oxygen is provided to the subsurface, existing bacteria will proceed with the breakdown of fuel residuals.

At \_\_\_\_\_ a \_\_\_\_\_  
blower system has been installed.

#### 3.2 SYSTEM DESCRIPTION

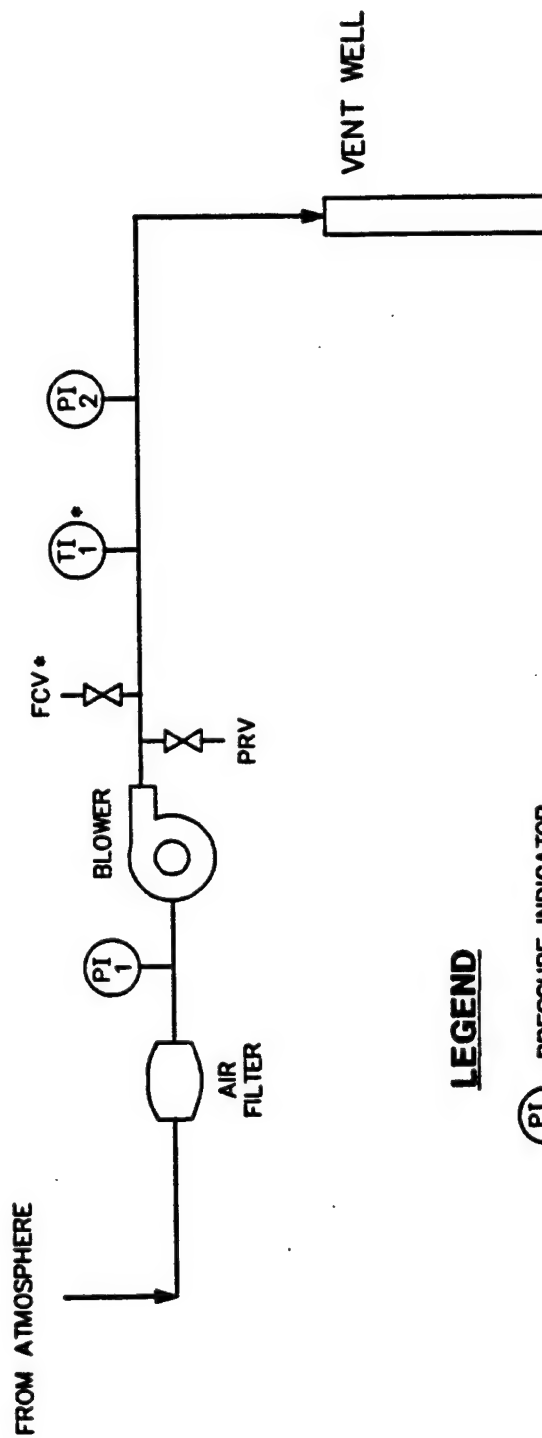
##### 3.2.1 Blower System

A \_\_\_\_\_ blower powered by a \_\_\_\_\_ horsepower direct-drive motor is the workhorse of the bioventing system. This blower is rated at a flow rate of \_\_\_\_\_ standard cubic feet per minute (scfm) at a pressure of \_\_\_\_\_; however, the actual performance of the blower will vary with changing site conditions. As installed, the blower was producing an estimated flow rate of \_\_\_\_\_ scfm at a pressure of \_\_\_\_\_. Vapor extraction systems may include an inlet knockout chamber for water condensation. All systems include an air filter to remove any particulates which are entrained in the air stream, and several valves and monitoring gauges which are described in the next section. A schematic of the blower system installed at \_\_\_\_\_ is shown on Figure 3.1. Corresponding blower performance curves, and relevant service information are provided in Appendices A and B.

##### 3.2.2 Monitoring Gauges

The bioventing system is equipped with vacuum and pressure gauges, temperature gauges, and a sampling port (vapor extraction only). Generally, gauges have been installed on the air injection system at the following locations: a vacuum gauge in the inlet piping and a pressure gauge in the outlet piping. For vapor extraction systems gauges are generally installed as follows: vacuum gauges in the





### LEGEND

- PI<sub>1</sub> PRESSURE INDICATOR
- TI<sub>1</sub> TEMPERATURE INDICATOR
- FCV FLOW CONTROL VALVE
- PRV PRESSURE RELIEF VALVE
- \* OPTIONAL

FIGURE 3.1

## TYPICAL BLOWER SYSTEM INSTRUMENTATION DIAGRAM FOR AIR INJECTION

ENGINEERING-SCIENCE, INC.  
Denver, Colorado

ES

inlet piping and at the knock-out chamber (as applicable), and a pressure gauge in the discharge piping. See Figure 3.1 for the locations of the gauges installed on the blower system at this site.

Temperature gauges may be located at the inlet and outlet of the blower system. These gauges are used to monitor the inlet and outlet temperature to determine the change in temperature across the blower. For air injection systems, ambient air temperature should be used when an inlet temperature gauge is not present. For vapor extraction systems, the inlet temperature is also used as an estimate of soil gas temperatures in the contaminated soil zone. See Figure 3.1 for the location(s) of the temperature gauges installed on the blower system at this site.

A sample port is located in the discharge piping on the outlet side of vapor extraction systems only. This sample port is used to collect offgas that is analyzed for carbon dioxide/oxygen and volatile organic compound concentrations. See Figure 3.1 for the location of the sampling port installed on the blower system at this site.

## **SECTION 4**

### **SYSTEM MAINTENANCE**

Although the motor and blower are relatively maintenance free, periodic system maintenance is required for proper operation and long life. Recommended maintenance procedures and schedules are described in detail in the instruction manuals included in Appendices A and B and briefly summarized in this section.

Filter inspection and knock-out chamber draining (as applicable) must be performed with the system turned off. To re-start the motor, open the manual air dilution valve (red handle) to protect the motor from excessive strain, start motor, and slowly close dilution valve. If the handle has been removed from the manual air dilution valve, do not open the valve or otherwise change the setting (it has been pre-set for a specific flow rate) before re-starting the blower.

#### **4.1 Blower/Motor**

The blower and motor are relatively maintenance free and should not require any periodic maintenance during the 1-year extended testing period. Both blower and motor have sealed bearings and do not require lubrication.

#### **4.2 KNOCK-OUT CHAMBER**

This section applies only to vapor extraction systems equipped with moisture knock-out chamber. To avoid damage caused by passing liquids solids through the blower a knock-out chamber has been installed in-line before the blower.

Free liquid should not be pumped through the blower. The knock-out chamber installed in-line before the blower intercepts entrained liquid, preventing damage to the blower. The knock-out chamber should be drained into an appropriate container once a month for the first few months and at less frequent intervals thereafter, if it appears that this will be sufficient to keep liquid from building up in the knock-out chamber. Condensation generally increases during the cold winter months. A facility employee should determine the best schedule for draining the knock-out chamber. The knock-out chamber can be drained by turning the system off and removing the cap or opening the valve at the base of the knock-out chamber. When all of the liquid has drained out, the system can be turned back on. It is recommended when re-starting the system that the air dilution valve (red-handled valve) be opened to protect the motor from excessive strain. If oily, drained liquids should be disposed of in an oil/water separator.

### 4.3 AIR FILTER

To avoid damage caused by passing solids through the blower, an air filter has been installed in-line before the blower. The filter element is paper and is accompanied by a polyurethane foam prefilter. The filter should be checked weekly for the first 2 months of operation. Again, a facility employee should determine the best schedule for filter replacement. The polyurethane prefilters can be washed with lukewarm water and a mild detergent. Paper filter elements should never be washed, but should be disposed of and replaced as necessary. When the pressure or vacuum drop across the filter is above 15 inches of water, a dirty filter element should be suspected, and cleaning or replacement should be performed.

To remove the filter, loosen the three clamps or the wing nut, lift the metal top off the air filter, and lift the air filter from the metal housing. Remove the polyurethane prefilter (if applicable) and wash before replacing. When replacing the filter, be careful that the rubber seals remain in place.

The filter element is manufactured by Solberg Manufacturing, Inc. in Itasca, Illinois. Their telephone number is (708) 773-1363. Additional filters can also be obtained through Engineering-Science, Inc. in Denver, Colorado. The ES contacts are Mr. Brian Blicher and \_\_\_\_\_ and they can be reached at (303) 831-8100. The filter model number is \_\_\_\_\_, and the number for the replacement element is \_\_\_\_\_. It is recommended that \_\_\_\_\_ keep at least one spare air filter at the site, four spare filters were supplied with the blower system.

### 4.4 MAINTENANCE SCHEDULE

The following maintenance schedule is recommended for this system. During the initial months of operation more frequent monitoring is recommended to ensure that any startup problems are quickly corrected. A daily drive-by inspection is recommended during the initial 2 weeks of operation to ensure that the blower system is still operating with no unusual sounds. Data collection sheets that can be used to record maintenance activities are included in Appendix C.

<u>Maintenance Item</u>	<u>Maintenance Frequency</u>
Filter	Check once per month, wash or replace as necessary (see Section 4.3).
Knock-out chamber	Drain once per month initially, then periodically (see Section 4.2).

### 4.5 MAJOR REPAIRS

Blowers systems are very reliable when properly maintained. Occasionally, a motor or blower will develop a serious problem. If a blower system fails to start, and a qualified electrician verifies that power is available at the blower or starter,

the Engineering-Science, Inc. site manager \_\_\_\_\_ should be called at ( ) \_\_\_\_\_. ES is responsible for major repairs during the first year of operation.

## **SECTION 5**

### **SYSTEM MONITORING**

#### **5.1 BLOWER PERFORMANCE MONITORING**

To monitor the blower performance, vacuum, pressure, and temperature will be measured. These data should be recorded weekly on a data collection sheet (provided in Appendix C). All measurements should be taken at the same time while the system is running. Because the system is loud, hearing protection should be worn at all times.

##### **5.1.1 Vacuum/Pressure**

With hearing protection in place, open the blower enclosure and record all vacuum and pressure readings directly from the gauges (in inches of water or psi). Record the measurements on a data collection sheet (Appendix C).

##### **5.1.2 Flow Rate**

The flow rate through the vent well and soils can be calculated when the inlet vacuum and outlet pressure of the blower are known. This pressure change across the blower (vacuum + pressure) can be compared to the performance curves for the blower in Appendix A or Appendix B to determine the approximate flow rate.

##### **5.1.3 Temperature**

With hearing protection in place, open the blower enclosure and record the temperature readings directly from the gauges in degrees Fahrenheit (°F). Record the measurements on a data collection sheet (provided in Appendix C). The temperature change can be converted to degrees Celsius (°C) using the formula  $^{\circ}\text{C} = (^{\circ}\text{F} - 32) \times 5/9$ .

#### **5.3 MONITORING SCHEDULE**

The following monitoring schedule is recommended for this system. During the initial months of operation, more frequent monitoring is recommended to ensure that any start up problems are quickly corrected. Data collection sheets have been provided to assist your data collection and are included in Appendix C.



Monitoring Item

Monitoring Frequency

Vacuum/Pressure

Daily during first week, then once per week.

Temperature

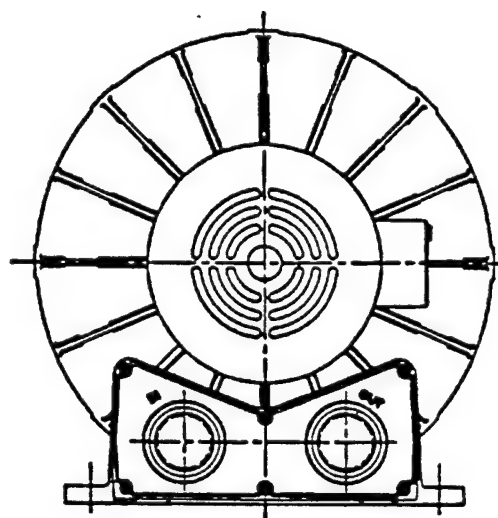
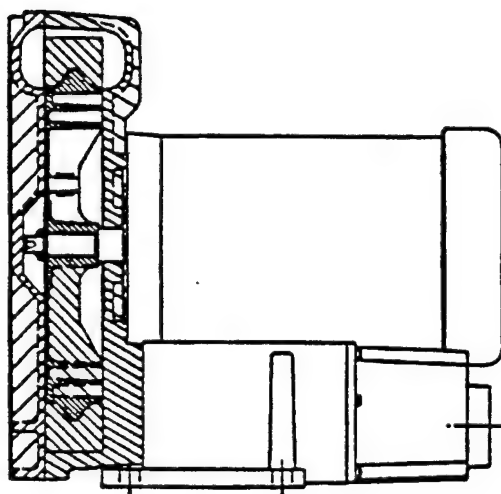
Daily during first week, then once per week.

**APPENDIX A**  
**REGENERATIVE BLOWER INFORMATION**



Post Office Box 97  
 Benton Harbor, Michigan 49023-0097  
 Ph: 616/926-6171  
 Fax: 616/925-8288

## Maintenance Instructions for Gast Standard Regenerative Blowers



For original equipment manufacturers  
 special models, consult your local distributor

### Gast Rebuilding Centers

Gast Mfg. Corp.  
 2550 Meadowbrook Rd.  
 Benton Harbor MI. 49022  
 Ph: 616/926-6171  
 Fax: 616/925-8288

Gast Mfg Corp.  
 505 Washington Avenue  
 Carlstadt, N. J. 07072  
 Ph: 201/933-8484  
 Fax: 201/933-5545

Brenner Fiedler. & Assoc.  
 13824 Bentley Place  
 Cerritos, CA. 90701  
 Ph: 213/404-2721  
 Fax: 213/404-7975

Wainbee, Limited  
 121 City View Drive  
 Toronto, Ont. Canada M9W 5A9  
 Ph: 416/243-1900  
 Fax: 416/243-2336

Wainbee, Limited  
 215 Brunswick Drive  
 Pointe Claire, P.Q. Canada H9R 4R7  
 Ph: 514/697-8810  
 Fax: 514/697-3070

Gast Mfg. Co. Limited.  
 Halifax Rd, Cressex Estate  
 High Wycombe, Bucks HP12 3SN  
 Ph: 44 494 523571  
 Fax: 44 494 436588

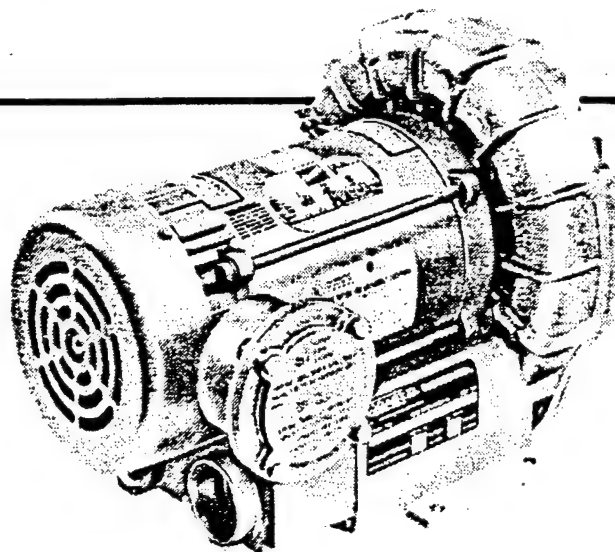
Japan Machinery Co. Ltd.  
 Central PO Box 1451  
 Tokyo 100-91 Japan  
 Ph: 813/3573-5421  
 Fax: 813/3571-7865

# Regenerative Blowers For Soil Remediation to 260 cfm

(5-91)



## R4, R5, R6P Series



### MODEL R4 SERIES

48" H<sub>2</sub>O MAX. VAC., 88 CFM OPEN FLOW

### MODEL R5 SERIES

60" H<sub>2</sub>O MAX. VAC., 145 CFM OPEN FLOW

### MODEL R6P SERIES

90" H<sub>2</sub>O MAX. VAC., 260 CFM OPEN FLOW

### PRODUCT FEATURES

- Explosion-proof motors UL (class 1, group D; class 2, groups F & G)
- Sealed air stream
- Rugged construction
- Low maintenance

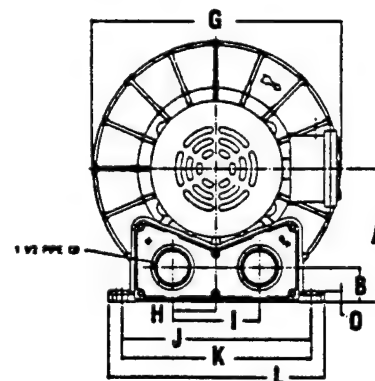
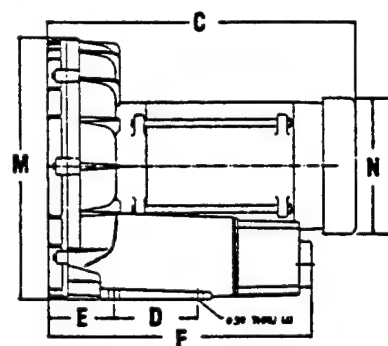
### RECOMMENDED ACCESSORIES

- Inlet filter AJ151G  
(Reducing filter plumbing from 2½" to 1½" is needed to accommodate filter on R4 and R5 models.)
- Relief valve AG258
- Vacuum gauge AE134

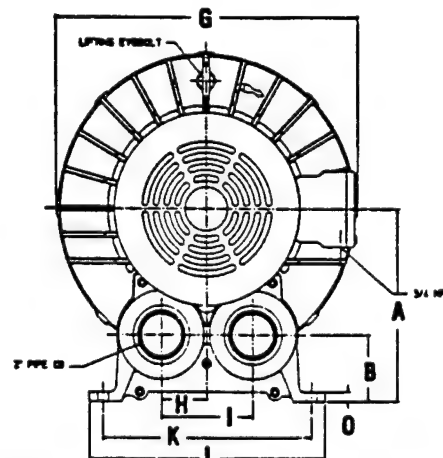
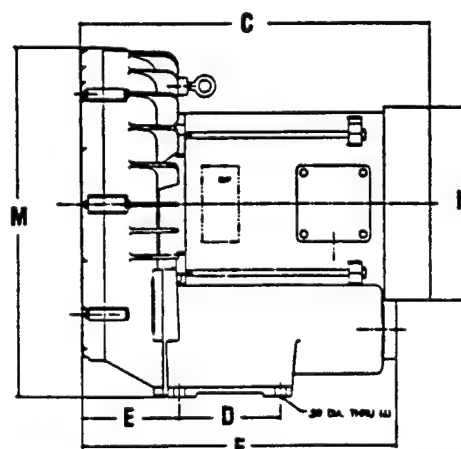
### Product Dimensions Metric (mm) U.S. Imperial (Inches)

Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
R4110N-50	157	43	360	95	72	316	313	50	101	225	227	254	293	175	11
	6.18	1.68	14.16	3.75	2.85	12.44	12.31	1.98	3.96	8.86	8.93	10.00	11.73	6.88	.44
R4310P-50	157	43	360	95	72	316	313	50	101	225	227	254	293	175	11
	6.18	1.68	14.17	3.75	2.84	12.44	12.31	1.98	3.96	8.86	8.93	10.00	11.73	6.88	.44
R5325R-50	178	46	423	114	91	361	344	60	121	260	262	298	350	183	15
	7.00	1.82	16.66	4.50	3.58	14.22	13.56	2.38	4.75	10.25	10.31	11.75	13.78	7.19	.59
R6P355R-50	248	80	482	140	137	438	428	64	127	-	290	325	463	257	13
	9.77	3.15	18.98	5.51	5.39	17.25	16.87	2.50	5.00	-	11.42	12.80	18.21	10.12	.50

Model R4 Series  
Model R5 Series

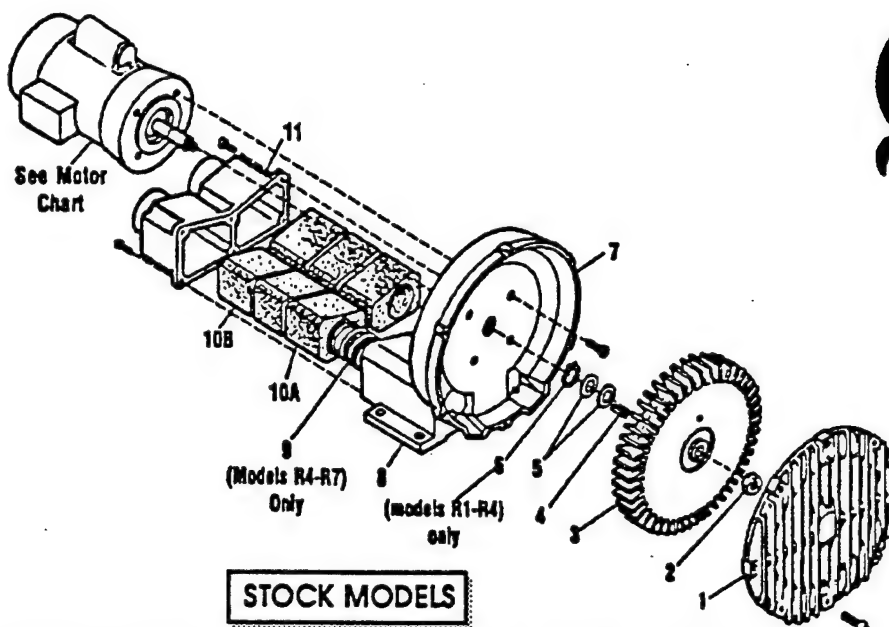


Model R6P Series



NOTE: These units with explosion-proof motors are designed specifically for qualified OEMs in the soil remediation industry. They are not intended to be applied for other uses without written acknowledgement from an authorized employee of Gast Manufacturing Corporation.

# 1st



## STOCK MODELS

Part Name	R1	R2	R3	R4	R5	R6	R6P	R6PP/R6PS	R7
#1 Cover	AJ101A	AJ101B	AJ101C	AJ101D	AJ101EQ	AJ101F	AJ101K	(2)AJ101KA	AJ101G
#2 Stopnut	BC187	BC187	BC181	BC181	BC181	BC181	BC181	(2)BC182	BC183
#3 Impeller	AJ102A	AJ102BQ	AJ102C	AJ102D	AJ102E	AJ102FR	AJ102K	(2)AJ102KA	AJ102GA
#4 Square Key	AH212C	AH212	AB136A	AB136D	AB136	AB136	AB136	(2)AB136	AC628
#5 Shim Spacer (s)	AJ132	AE686-3	AJ109	AJ109	AJ109	AJ116A	AJ116A	AJ116A	AJ110
#6 Retaining Ring	AJ145	AJ145	AJ149	AJ149					
#7 Housing	AJ103A	AJ103BQ	AJ103C	AJ103DR	AJ103E	AJ103F	AJ103K	AJ103KD	AJ103GA
#8 Muffler Box					AJ104E	AJ104F			
#9 Spring				AJ113DR	AJ113DQ	AJ113FQ	AJ113FQ		AJ113G
#10A Foam	(4)AJ112A	(4)AJ112B	(4)AJ112C	(4)AJ112DS	(4)AJ112ER	(6)AJ112F	(8)AJ112K		(8)AJ112GA
#10B Foam		(2)AJ112BQ	(2)AJ112CQ	(2)AJ112DR	(2)AJ112EQ				
#11 Muffler Extension/ Adapter Plate	AJ106H	AJ106BQ	AJ106CQ	AJ106DQ	AJ106EQ	AJ106FQ	AJ104K		AJ104GA
Shim Kit	K396	K396							K395

## MOTOR CHART

REGENAIR MODEL NUMBER	MOTOR NUMBER	MOTOR SPECIFICATIONS		PHASE
		60 HZ VOLTS	50 HZ VOLTS	
R1102	J111X	115/208-230	110/220-240	1
R1102C	J112X	115		1
R2103	J311X	115/208-230	110/220	1
R2105	J411X	115/208-230	110/220	1
R2303A	J310	208-230/460	220/380-415	3
R2303F	J313	208-230	220	3
R3105-1/R3105-12	J411X	115/208-230	110/220-240	1
R3305A-1/R3305A-13	J410	208-230/460	220/380-415	3
R4110-2	J611AX	115/208-230	110/220-240	1
R4310A-2	J610	208-230/460	220/380-415	3
R5125-2	J811X	115/208-230		1
R5325A-2	J810X	208-230/460	220/380-415	3
R6125-2	J811X	115/208-230		1
R6325A-2	J810X	208-230/460	220/380-415	3
R6335A-2	J910X	208-230/460	220/380-415	3
R6150J-2	J1013	230		1
R6350A-2	J1010	208-230/460	220/380-415	3
R6P335A	J910X	208-230/460	220/380-415	3
R6P350A	J1010	208-230/460	220/380-415	3
R6P355A	J1110A	208-230/460	220/380-415	3
R7100A-2*	J1210B	208-230/460	220/380-415	3
R6PP/R6PS3110M	JD1100	208-230/460	220/380-415	3

\* No lubrication needed at start up.  
Bearings lubricated at factory.

\* Motor is equipped with alermitte fitting.  
Clean tip of fitting and apply grease gun.  
Use 1 to 2 strokes of high quality ball  
bearing grease.

Consistency	Type	Typical Grease
Medium	Lithium	Shell Dolum R

Hours of service per year	Suggested Re-lube Interval
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5,000	3 years
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Continual Normal Application	1 year
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Seasonal service motor idle for 6 months or more	1 year beginning of season 6 months
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Continuous-high ambients,  
dirty or moist applications.

## 60 HZ FLOW DATA (CFM)

All performance figures relate to stock models. A few high pressure units may be available. Consult your local distributor.

Regenair Model Number	<b>P R E S S U R E</b>						Maximum Pressure "H <sub>2</sub> O"
	0"H <sub>2</sub> O	20"H <sub>2</sub> O	40"H <sub>2</sub> O	60"H <sub>2</sub> O	80"H <sub>2</sub> O	100"H <sub>2</sub> O	
R1	26	14					28
R2	42	26					38
R3105-1	52	38	14				42
R3105-12	52	36	23				55
R3305A-13	52	36	23				55
R4	90	70	50				52
R5	145	130	100				65
R6125-2	200	180					35
R6325A-2	200	180	152				40
R6335A-2	205	175	155	135			70
R6350A-2	200	180	150	130	110	80	105
R6P335A	290	250					30
R6P350A	300	260	230	200			60
R6P355A	300	260	230	200	160		90
R7100A-2	420	380	340	310	280	230	115
R6PP311OM	485	452	420	380	330		95
R6PS311OM	265	258	252	244	236	226	170

Regenair Model Number	<b>V A C U U M</b>					Maximum Vacuum "H <sub>2</sub> O"
	0"H <sub>2</sub> O	20"H <sub>2</sub> O	40"H <sub>2</sub> O	60"H <sub>2</sub> O	80"H <sub>2</sub> O	
R1	25	14				26
R2	40	22				34
R3105-1	50	34	9			40
R3105-12	51	34	20			50
R3305A-13	51	34	20			50
R4	82	62	39			48
R5	140	115	90	50		60
R6125-2	190	155	125			45
R6325A-2	190	155	125			45
R6335A-2	190	150	125	100		75
R6350A-2	190	180	150	100	70	90
R6P335A	270	230				37
R6P350A	280	240	210	170		70
R6P355A	280	240	210	170	100	86
R7100A-2	410	350	300	250	170	90
R6PP311OM	470	425	375	320	220	80
R6PS311OM	240	225	210	195	175	130

\*This number indicates the maximum static pressure differential recommended (with cooling air still flowing through unit). In general, units 1hp or less can be dead headed. Check with local representative or distributor to verify which models apply.

Operation of the blower above the recommended maximum duty will cause premature failure due to the build up of heat damaging the components.

Performance data was determined under the following conditions:

- 1) Unit in a temperature stable condition.
- 2) Test conditions: Inlet air density at 0.075lbs. per cubic foot. (20°C [68°F], 29.92 in. Hg [14.7PSIA]).
- 3) Normal performance variations on the resistance curve within +/- 10% of supplied data can be expected.
- 4) Specifications subject to change without notice.
- 5) All performance at 60Hz operation.





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Benton Harbor, MI. 49023-0097  
Ph: 616/926-6171  
Fax: 616/925-8288

70-6100  
F2-205/8/92  
AK811 Rev. E

# INSTALLATION AND OPERATING INSTRUCTIONS FOR GAST HAZARDOUS DUTY REGENAIR BLOWERS

This instruction applies to the following  
models ONLY: R3105N-50, R4110N-50,  
R4310P-50, R4P115N-50, R5125Q-50,  
R5325R-50, R6130Q-50, R6P155Q-50,  
R6350R-50, R6P355R-50 and R7100R-50.

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## *Gast Authorized Service Facilities are Located in the locations listed below*

Gast Manufacturing Corporation  
605 Washington Avenue  
Carlstadt, N. J. 07072  
Ph: 201/933-8484  
Fax: 201/933-5545

Gast Manufacturing Corporation  
2550 Meadowbrook Road  
Benton Harbor, MI. 49022  
Ph: 616/926-6171  
Fax: 616/925-8288

Brenner Fiedler & Associates  
13824 Bentley Place  
Cerritos, CA. 90701  
Ph: 213/404-2721  
Ph: 800/843-5558  
Fax: 213/404-7975

Wainbee Limited  
215 Brunswick Blvd.  
Pointe Claire, Quebec  
Canada H9R 4R7  
Ph: 514/697-8810  
Fax: 514/697-3070

Wainbee Limited  
5789 Coopers Ave.  
Mississauga, Ontario  
Canada L4Z 3S6  
Ph: 416/243-1900  
Fax: 416/243-2336

Japan Machinery  
Central PO Box 1451  
Toyko 100-91, Japan  
Ph: 813 3573-5421  
Fax: 813 3571-7896

Gast Manufacturing Co. Ltd.  
Halifax Road, Cressex Estate  
High Wycombe, Bucks HP12 3SN  
England  
Ph: 44 494 523571  
Fax: 44 494 436588

### Safety

- ⚠ This is the safety alert symbol. When you see this symbol, personal injury is possible. The degree of injury is shown by the following signal words:
- ⚠ **DANGER:** Severe injury or death will occur if hazard is ignored.
  - ⚠ **WARNING:** Severe injury or death can occur if hazard is ignored.
  - ⚠ **CAUTION:** Minor injury or property damage can occur if hazard is ignored.
- Review the following information carefully before operating.

### General Information

- ⚠ **DANGER:** Do not pump flammable or explosive gases or operate in an atmosphere containing them. Ambient temperature for normal operation should not exceed 40 degrees C (105 degrees F). For higher ambient operation, consult the factory. Blower performance is reduced by the lower atmospheric pressure of high altitudes. If it applies to this unit, consult a Gast distributor or the factory for details.

### Installation

- ⚠ **WARNING:** Electric Shock can result from bad wiring. Wiring must conform to all required safety codes and be installed by a qualified person.  
Grounding is required.  
The Gast Regenair blower can be installed in any position. The flow of cooling air over the blower and motor must not be blocked.
- PLUMBING** - The threaded pipe ports are designed as connection ports only and will not support the plumbing. Be sure to use the same or larger size pipe and fittings to prevent air flow restriction and over-heating of the blower. When installing plumbing, be sure to use a small amount of pipe thread lubricant. This protects the threads in the aluminum blower housing. Dirt and chips, often found in new plumbing, should not be allowed to enter the blower.
- NOISE** - To reduce noise and vibration, the unit should be mounted on a solid surface that will not increase sound. The use of shock mounts or vibration isolation material is recommended. If needed, inlet or discharge noise can be reduced by attaching muffler assemblies (see accessories).
- ROTATION** - The Gast Regenair blower should only rotate clockwise as viewed from the electric motor side. This is marked with an arrow in the casting. Proper rotation can be confirmed by checking air flow at the IN and OUT ports. On blowers powered by a three phase motor, rotation is reversed by changing any two of the three power wires.

### Operation

- ⚠ **WARNING:** Solid or liquid material exiting the blower or piping can cause eye damage or skin cuts. Keep away from air stream.
- ⚠ **CAUTION:** Attach blower to solid surface before starting. Prevent injury or damage from unit movement.  
Air containing solid particles or liquid must pass through a filter before entering the blower (see accessories list for filter suggestions). Blowers must have mufflers, filters, other accessories and all piping attached before starting. Any foreign material passing through the blower may cause internal damage.
- ⚠ **CAUTION:** Outlet piping can burn skin. Guard or limit access.  
Mark "CAUTION Hot surface. Can cause burns."  
Air temperature increases when passing through the blower. When run at duties above 50 in. H<sub>2</sub>O, metal pipe may be required for hot exhaust air.
- The blower must not be operated above the limits for continuous duty. "Standard" R1, R2, R3 and R4 can operate continuously with not air flowing through the blower. Other units can only be run at the rating shown on the model number label. Do not close off inlet (for vacuum) or exhaust (for pressure) to reduce extra air flow. This could cause added heat and motor load.
- ACCESSORIES** - Gast pressure gauges AJ496 or AE133 and vacuum gauges AJ497 or AE134 show blower duty. The Gast pressure/vacuum relief valve, AG258, will limit the operating duty by admitting or relieving air. It also allows full flow through the blower when the relief valve closes.

### Servicing

- ⚠ **WARNING:** Disconnect electric power before servicing. Be sure rotating parts have stopped. Electric shock or severe cuts can result. Inlet and exhaust filters need occasional cleaning or replacement of the elements. Failure to do so will result in more pressure drop, reduced air flow and hotter operation. The outside of the unit requires cleaning of dust and dirt. The inside of the blower also may need cleaning to remove material coating the impeller and housing. If not done, the buildup can cause vibration, hotter operation and reduced flow. Noise absorbing foam in the mufflers may need replacement.
- KEEP THIS INFORMATION WITH THE BLOWER. REFER TO IT FOR SAFE INSTALLATION, OPERATION OR SERVICE.**

TROUBLESHOOTING		
Symptom	Possible Diagnosis	Possible Remedy
Excess Vibration	Impeller damaged by foreign material Impeller contaminated by foreign material	Replace impeller Clean impeller, install adequate filtration.
Abnormal sound	Motor bearing failed Impeller rubbing against cover or housing	Replace bearings Repair Blower, check clearances.
Increase in sound	Foreign material can coat or destroy muffler foam.	Replace foam muffler elements, trap or filter foreign material.
Blown fuse	Electrical wiring problem	Have qualified person check fuse capacity and wiring.
Unit very hot	Running at too high a pressure or vacuum.	Install a relief valve

# OPERATING AND MAINTENANCE INSTRUCTIONS

## SAFETY

This is the safety alert symbol. When you see this symbol personal injury is possible. The degree of injury is shown by the following signal words:

- DANGER** Severe injury or death will occur if hazard is ignored.
- WARNING** Severe injury or death can occur if hazard is ignored.
- CAUTION** Minor injury or property damage can occur if hazard is ignored.

Review the following information carefully before operating.

## GENERAL INFORMATION

*This instruction applies to the following models ONLY: R3105N-50, R4110N-50, R4310P-50, R4P115N-50, R5125Q-50, R5325R-50, R6130Q-50, R6P155Q-50, R6350R-50, R6P355R-50 and R7100R-50. These blowers are intended for use in Soil Vapor Extraction Systems. The blowers are sealed at the factory for very low leakage. They are powered with a U.L. listed electric motor Class 1 Div. 1 Group D motors for Hazardous Duty locations. Ambient temperature for normal full load operation should not exceed 40° C (105° F). For higher ambient operation, contact the factory.*

Gast Manufacturing Corporation may offer general application guidance; however, suitability of the particular blower and/or accessories is ultimately the responsibility of the user, not the manufacturer of the blower.

## INSTALLATION

**DANGER** Models R5325R-50, R6130Q-50, R6350R-50, R5125Q-50, R6P155Q-50, R6P355R-50 AND R7100R-50 use Pilot Duty Thermal Overload Protection. Connecting this protection to the proper control circuitry is mandated by UL674 and NEC501. Failure to do so could/ may result in a EXPLOSION. See pages 3 and 4 for recommended wiring schematic for these models.

**WARNING** Electric shock can result from bad wiring. A qualified person must install all wiring, conforming to all required safety codes. Grounding is necessary.

**WARNING** This blower is intended for use on soil vapor extraction equipment. Any other use must be approved in writing by Gast Manufacturing Corp. Install this blower in any mounting position. Do not block the flow of cooling air over the blower and motor.

**PLUMBING** - Use the threaded pipe ports for connection only. They will not support the plumbing. Be sure to use the same or larger size pipe to prevent air flow restriction and overheating of the blower. When installing fittings, be sure to use pipe thread sealant. This protects the threads in the blower housing and prevents leakage. Dirt and chips are often found in new plumbing. Do not allow them to enter the blower.

**NOISE** - Mount the unit on a solid surface that will not increase the sound. This will reduce noise and vibration. We suggest the use of shock mounts or vibration isolation material for mounting.

**ROTATION** - The Gast Regenair Blower should only rotate clockwise as viewed from the electric motor side. The casting has an arrow showing the correct direction. Confirm the proper rotation by checking air flow at the IN and OUT ports. If needed reverse rotation of three phase motors by changing the position of any two of the power line wires.

## OPERATION

**WARNING** Solid or liquid material exiting the blower or piping can cause eye damage or skin cuts. Keep away from air stream.

**WARNING** - Gast Manufacturing Corporation will not knowingly specify, design or build any blower for installation in a hazardous, combustible or explosive location without a motor conforming to the proper NEMA or U. L. standards. Blowers with standard TEFC motors should never be utilized for soil vapor extraction applications or where local state and/or Federal codes specify the use of explosion-proof motors (as defined by the National Electric Code, Articles 100,500 c1990).

**CAUTION** Attach blower to solid surface before starting to prevent injury or damage from unit movement. Air containing solid particles or liquid must pass through a filter before entering the blower. Blowers must have filters, other accessories and all piping attached before starting. Any foreign material passing through the blower may cause internal damage to the blower.

**CAUTION** Outlet piping can burn skin. Guard or limit access. Mark "CAUTION Hot Surface. Can Cause Burns". Air temperature increases when passing through the blower. When run at duties above 50 in. H<sub>2</sub>O, metal pipe may be required for hot exhaust air. The blower must not be operated above the limits for continuous duty. Only models R3105N-50, R4110N-50 and R4310P-50 can be operated continuously with no air flowing through the blower. Other units can only be run at the rating shown on the model number label. Do not Close off inlet (for vacuum) to reduce extra air flow. This will cause added heat and motor load. Blower exhaust air in excess of 230°F indicates operation in excess of rating which can cause the blower to fail.

**ACCESSORIES** - Gast pressure gauge AJ496 and vacuum gauges AJ497 or AE134 show blower duty. The Gast pressure/vacuum relief valve, AG258, will limit the operating duty by admitting or relieving air. It also allows full flow through the blower when the relief valve closes.

## SERVICING

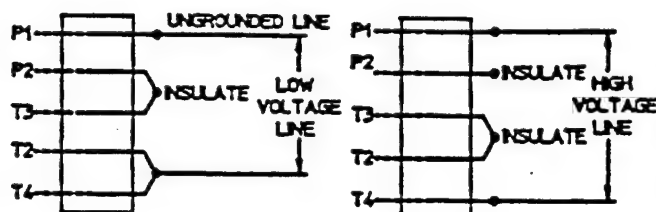
**⚠ WARNING** To retain their sealed construction they should be serviced by Gast authorized service centers ONLY. These models are sealed at the factory for very low leakage.

**⚠ WARNING** Turn off electric power before removing blower from service. Be sure rotating parts have stopped. Electric shock or severe cuts can result. Inlet and exhaust filters attached to the blower may need cleaning or replacement of the elements. Failure to do so will result in more pressure drop, reduced air flow and hotter operation of the blower.

The outside of the unit requires cleaning of dust and dirt. The inside of the blower also may need cleaning to remove foreign material coating the impeller and housing. This should be done at a Gast Authorized Service Center. This buildup can cause vibration, failure of the motor to operate or reduced flow.

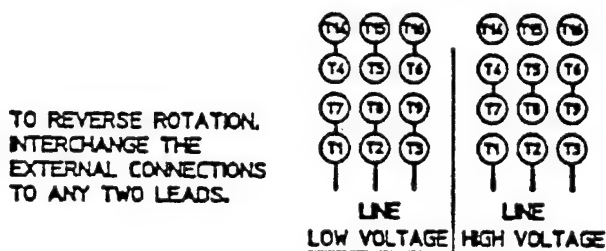
**KEEP THIS INFORMATION WITH THIS BLOWER.  
REFER TO IT FOR SAFE INSTALLATION,  
OPERATION OR SERVICE.**

### MOTOR WIRING DIAGRAM FOR R4110N-50 & R3105N-50



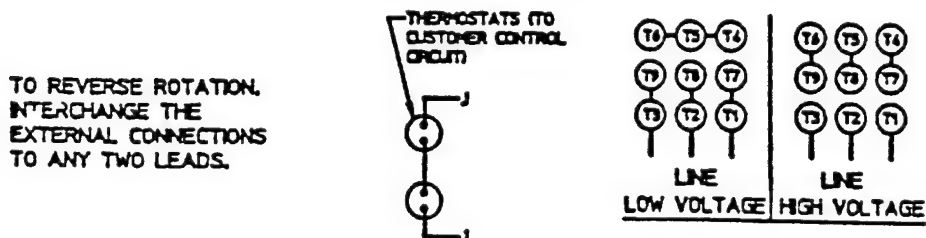
**>>> WARNING**  
THIS MOTOR IS THERMALLY PROTECTED AND WILL AUTOMATICALLY RESTART WHEN PROTECTOR RESETS. ALWAYS DISCONNECT POWER SUPPLY BEFORE SERVING.

### MOTORS WIRING DIAGRAM FOR R4310P-50

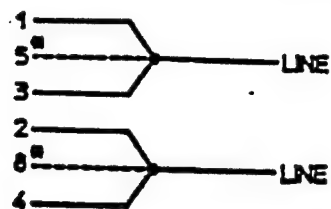


**>>> WARNING**  
THIS MOTOR IS THERMALLY PROTECTED AND WILL AUTOMATICALLY RESTART WHEN PROTECTOR RESETS. ALWAYS DISCONNECT POWER SUPPLY BEFORE SERVING.

### MOTORS WIRING DIAGRAM FOR R5325R-50, R6350R-50, R6P355R-50, & R7100R-50

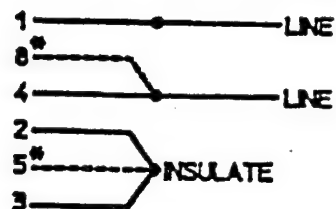


## MOTOR WIRING DIAGRAM FOR R5125Q-50 & R4P115N-50



— THERMOSTAT  
— THERMOSTAT

LOW VOLTAGE



— THERMOSTAT  
— THERMOSTAT

HIGH VOLTAGE

• R5125Q-50 BLOWERS PRODUCED AFTER SEPTEMBER 1992 (SER. NO. 0992)  
DO NOT HAVE MOTOR LEADS 5 & 8.

## MOTOR WIRING DIAGRAM FOR R6130Q-50 & R6P155Q-50

CONNECT THERMOSTAT  
TO MOTOR PROTECTION  
CIRCUIT

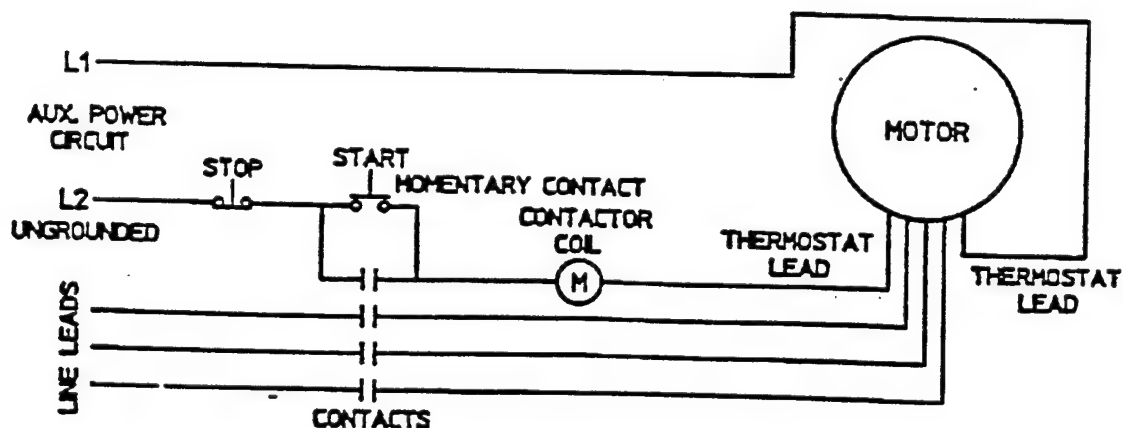
T1 — LINE

T4 — LINE

— THERMOSTAT

— THERMOSTAT

## CONNECTION FOR THERMOSTAT MOTOR PROTECTION

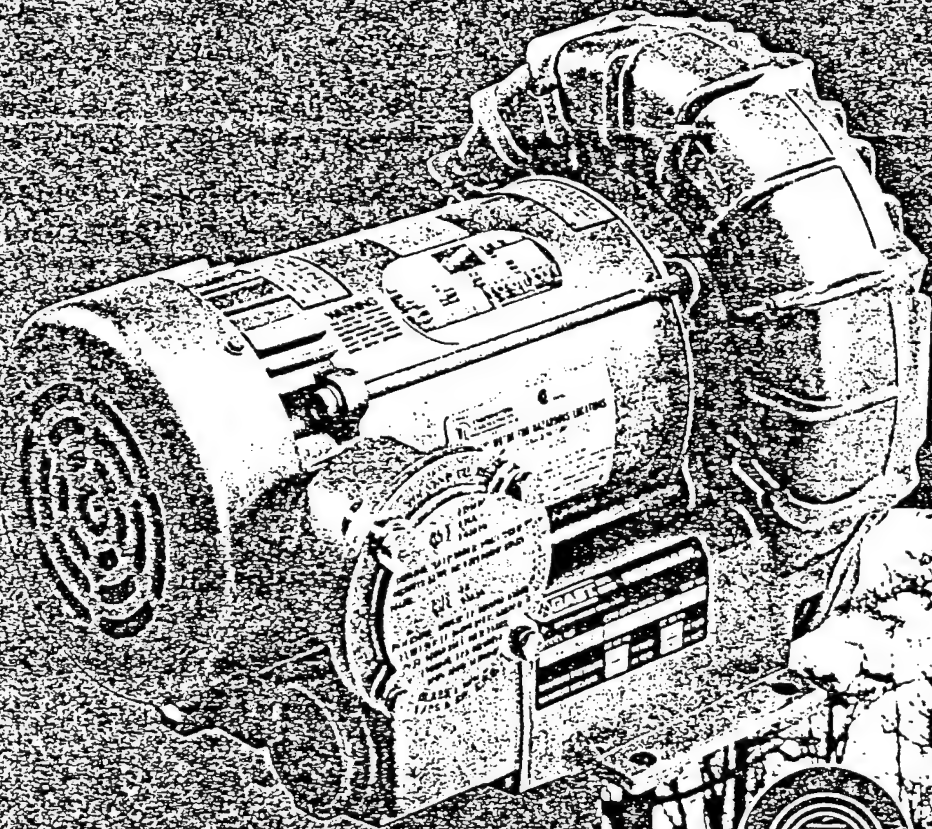


THERMOSTATS TO BE CONNECTED IN SERIES WITH  
CONTROL AS SHOWN. MOTOR FURNISHED WITH  
AUTOMATIC THERMOSTATS RATED A.C. 115-600V. 720VA

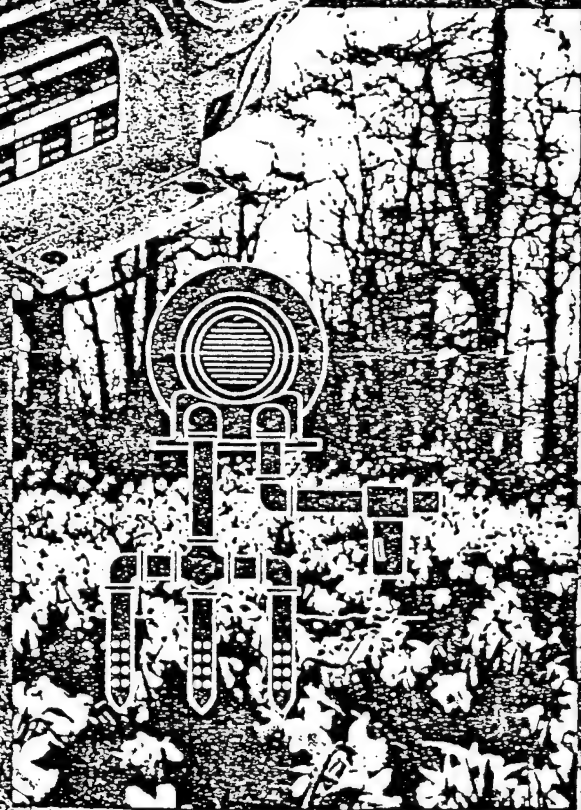
AK811 rev. E



# Blowers for **SOIL VAPOR EXTRACTION**



 **GAST.**



## Your Warranty

REGARDLESS OF CAUSE, if a product you buy from this catalog does not work right, Gast will repair or replace it once, at no charge, for up to one year from the date of shipment from the factory.

In the course of repair or replacement, Gast may send you written recommendations on how to prevent a problem from happening again.

Gast reserves the right to withdraw this warranty if you do not follow these recommendations. Customer is responsible for freight charges both to and from Gast in all cases.

THIS WARRANTY DOES NOT APPLY TO ELECTRIC MOTORS, ELECTRICAL CONTROLS AND GASOLINE ENGINES, WHICH GAST OBTAINS FROM OTHER MANUFACTURERS. A MOTOR OR ENGINE CARRIES ONLY THE WARRANTY OF THE COMPANY THAT MAKES IT. THIS WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL OR IMPLIED, INCLUDING THE WARRANTY OF MERCHANTABILITY AND OF FITNESS FOR ANY PARTICULAR PURPOSE. GAST'S LIABILITY IS IN ALL CASES LIMITED TO THE REPLACEMENT PRICE OF ITS PRODUCT. GAST SHALL NOT BE LIABLE FOR ANY OTHER DAMAGES, WHETHER CONSEQUENTIAL, INDIRECT, OR INCIDENTAL, ARISING FROM THE SALE OR USE OF ITS PRODUCTS.

*Gast's sales personnel may modify this warranty, but only by signing a specific, written description of any modifications.*

## Gast Manufacturing Corporation

### Customer Sales & Service

2550 Meadowbrook Road  
Benton Harbor, MI 49022  
Ph: 616/926-6171  
Fax: 616/925-8288

### Corporate Headquarters

Post Office Box 97  
Benton Harbor, MI 49023  
Ph: 616/926-6171  
Fax: 616/927-0808

### Eastern Sales Office

515 Washington Avenue  
Carlstadt, NJ 07072  
Ph: 201/933-8484  
Fax: 201/933-5545

### Midwestern Sales Offices

755 North Edgewood  
Wood Dale, IL 60191  
Ph: 708/860-7477  
Ph: 800/800-8715  
Fax: 708/860-1748

### European Sales Office

Halifax Road, Cressex Estate  
High Wycombe, Bucks HP 12 3SN  
Ph: 44 494 523571  
Fax: 44 494 436588  
Telex 83488





# FOR SOIL VAPOR

designed to supply up to  
420 cfm (714m<sup>3</sup>/hr),  
7 in Hg/224 mbar (90" H<sub>2</sub>O) or  
4 psi/249 mbar (100" H<sub>2</sub>O)

The Gast reputation for quality and customer satisfaction is renowned throughout the world. Since 1921 we have been supplying air moving products that have set the industry standard of excellence. Our regenerative blowers for soil vapor extraction are no exception. Designed to extract vapors from contaminated soils, these models are used in conjunction with site-supplied special filters which clean the contaminants before venting them to the atmosphere. Since this process can take months or even years, Gast environmental blowers are a perfect solution; the only wearing part is the bearing, which is rated for up to 25,000 hours of service. Also, each of our motor-mounted models comes with a Class 1 Group D explosion-proof motor as a standard feature. Combining this quality with the strongest warranty in the business and a vast national and international distribution network providing product and technical support, we think you'll find our special Gast Regenair® blowers to be the right choice for your soil vapor extraction needs.

## MODEL R4 SERIES

48" H<sub>2</sub>O MAX. VAC., 51" H<sub>2</sub>O MAX. PRESSURE  
92 CFM OPEN FLOW

## MODEL R5 SERIES

60" H<sub>2</sub>O MAX. VAC., 65" H<sub>2</sub>O MAX. PRESSURE  
160 CFM OPEN FLOW

## MODEL R6 SERIES

70" H<sub>2</sub>O MAX. VAC., 75" H<sub>2</sub>O MAX. PRESSURE  
215 CFM OPEN FLOW

## MODEL R6P SERIES

85" H<sub>2</sub>O MAX. VAC., 100" H<sub>2</sub>O MAX. PRESSURE  
280 CFM OPEN FLOW

## MODEL R7 SERIES

90" H<sub>2</sub>O MAX. VAC., 90" H<sub>2</sub>O MAX. PRESSURE  
420 CFM OPEN FLOW

## PRODUCT FEATURES

- Explosion-proof motors UL (class 1, group D)
- Sealed air stream
- Rugged construction
- Low maintenance

## Product Dimensions

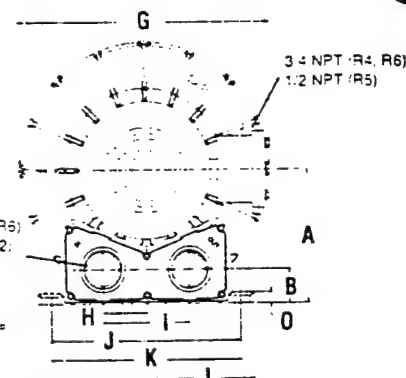
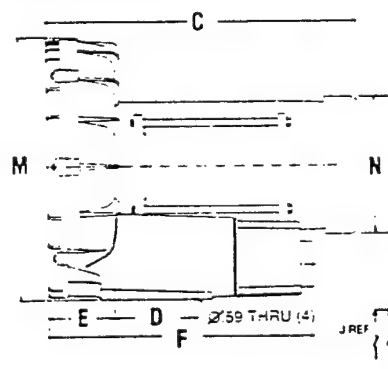
Model	Metric (mm)				U.S. Imperial (inches)															
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O					
R4110N-50	157	43	389	95	72	316	313	50	101	225	227	254	293	175	11					
	6.18	1.68	15.30	3.75	2.85	12.44	12.31	1.98	3.96	8.86	8.93	10.00	11.73	6.88	.44					
R4310P-50	157	43	356	95	72	316	313	50	101	225	227	254	293	175	11					
	6.18	1.68	14.03	3.75	2.84	12.44	12.31	1.98	3.96	8.86	8.93	10.00	11.73	6.88	.44					
R5125Q-50	178	46	445	114	91	361	344	60	121	260	262	298	350	173	15					
	7.00	1.82	17.50	4.50	3.58	14.22	13.56	2.38	4.75	10.25	10.31	11.75	13.78	6.81	.59					
R5325R-50	178	46	423	114	91	361	344	60	121	260	262	298	350	183	15					
	7.00	1.82	16.66	4.50	3.58	14.22	13.56	2.38	4.75	10.25	10.31	11.75	13.78	7.19	.59					
R6130Q-50	197	49	511	140	98	404	389	62	125	289	290	329	391	217	13					
	7.75	1.94	20.13	5.50	3.85	15.89	15.30	2.46	4.92	11.38	11.42	12.96	15.38	8.56	.52					
R6P1550Q-50	248	80	602	140	137	438	428	64	127	-	290	325	463	257	13					
	9.77	3.15	23.7	5.51	5.39	17.25	16.87	2.50	5.00	-	11.42	12.80	18.21	10.12	.50					
R6P355R-50	248	80	554	140	137	438	428	64	127	-	290	325	463	257	13					
	9.77	3.15	21.80	5.51	5.39	17.25	16.87	2.50	5.00	-	11.42	12.80	18.21	10.12	.50					
R7100R-50	274	92	577	216	212	545	457	100	200	-	375	410	509	257	14					
	10.79	3.64	22.72	8.50	8.33	21.46	18.00	3.94	7.88	-	14.76	16.14	20.02	10.12	.56					

Notice: Specifications subject to change without notice.

## R4 Series

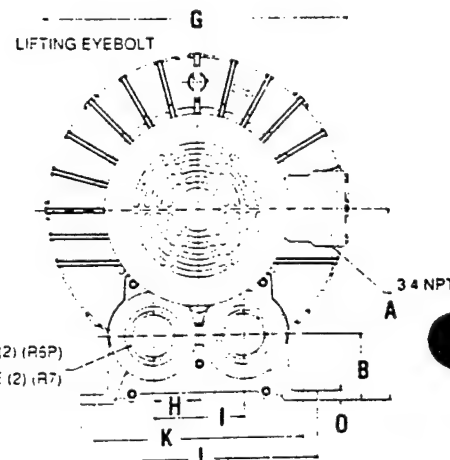
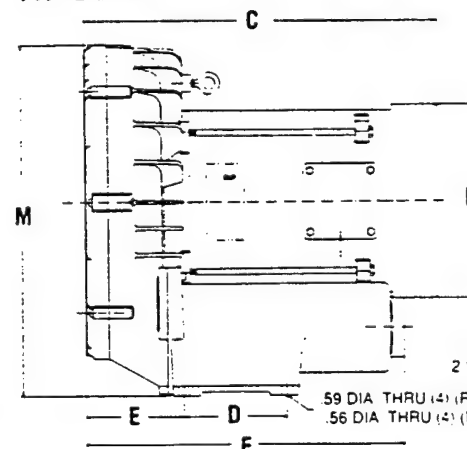
## R5 Series

## R6 Series



## R6P Series

## R7 Series



More models may be available - please consult factory

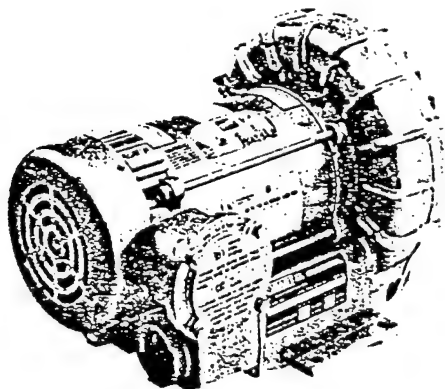
# EXTRACTION...

## Product Specifications

Model Number	Hz	Motor Specs	Full Load Amps	HP	RPM	Max Vac "H <sub>2</sub> O mbar	Max Pressure "H <sub>2</sub> O mbar	Max Flow cfm m <sup>3</sup> /h	Net. Wt lbs.
R4110N-50	50	110/220-240-50-1*	9.2/5.2-4.6	0.6	2850	35 87	38 95	74 126	60
	60	115/208-230-60-1*	11.4/6.2-5.6	1.0	3450	48 120	51 127	92 156	
R4310P-50	50	220/380-50-3*	3.2/1.6	0.6	2850	35 87	38 95	74 126	58
	60	208-230/460-60-3*	3.4-3.3/1.65	1.0	3450	48 120	51 127	92 156	
R5125Q-50	60	115/230-60-1	25/12.5	2.0	3450	60 149	55 137	160 272	77
R5325R-50	50	190-220/380-415-50-3	5.0-4.4/2.5-2.6	1.5	2850	47 117	50 125	133 226	75
	60	208-230/460-60-3	6.0-5.6/2.8	2.0	3450	60 149	65 162	160 272	
R6130Q-50	50	220-240-50-1	14.7-13.5	2.5	2850	65 162	75 187	182 309	129
	60	230-60-1	16.3	3.0	3450	70 174	60 149	215 365	
R6P155Q-50	50	220-240-50-1	20.8-19.1	4.0	2850	65 162	80 199	235 399	243
	60	230-60-1	29.9	5.5	3450	85 212	95 237	280 476	
R6P355R-50	50	190-220/380-415-50-3	14.9-11/7.45-5.8	4.5	2850	65 162	80 199	232 394	233
	60	208-230/460-60-3	20-18/9	6.0	3450	85 212	100 249	280 476	
R7100R-50	50	190-220/380-415-50-3	20.8-18.9/10.4-9.5	8	2850	72 179	80 199	350 595	297
	60	208-230/460-60-3	26.5-24/12	10	3450	90 224	90 224	420 714	

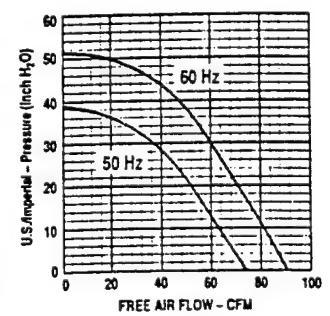
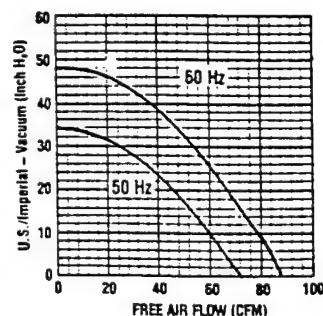
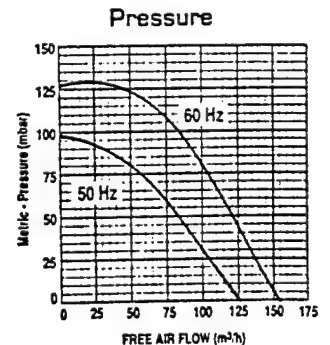
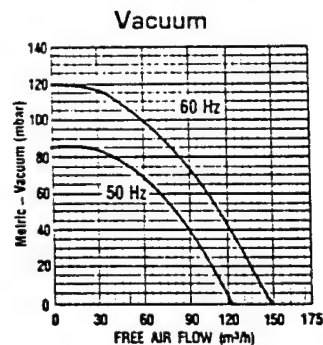
\*Models have automatic reset thermal protection.

## Product Performance (Metric/U.S. Imperial)



NOTE: These units with explosion-proof motors are designed specifically for qualified OEMs in the soil vapor extraction industry. They are not intended to be applied for other uses without written acknowledgment from an authorized employee of Gast Manufacturing Corporation.

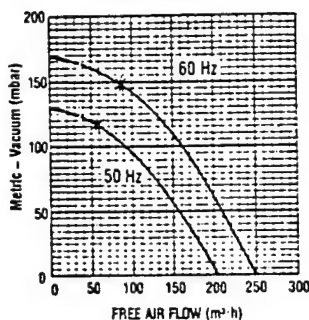
## Model R4 Series



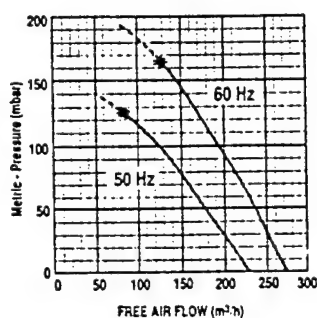
## Model R5 Series

## Model R6 Series

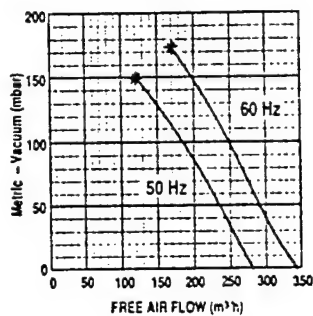
Vacuum



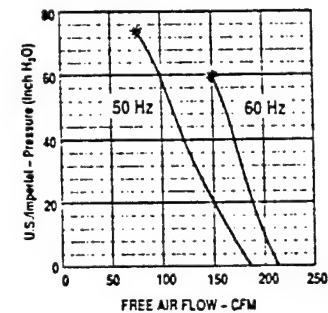
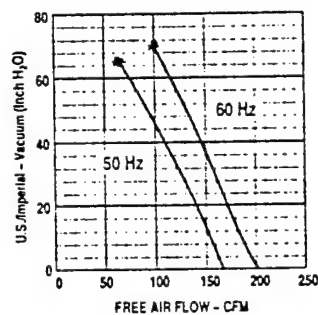
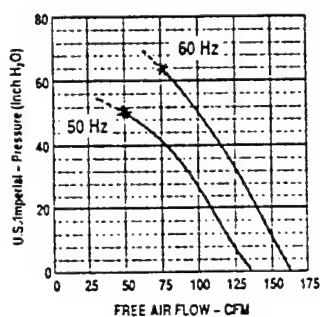
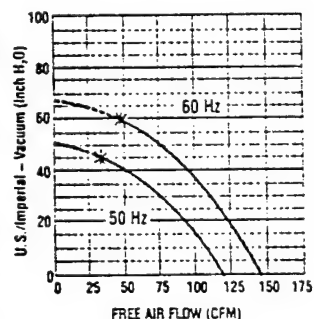
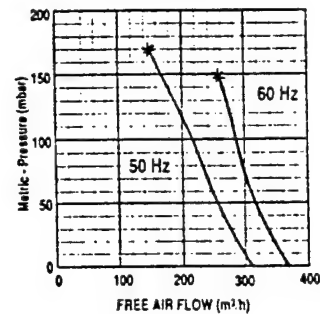
Pressure



Vacuum



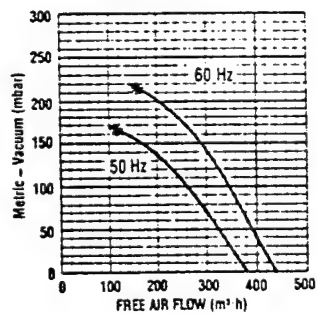
Pressure



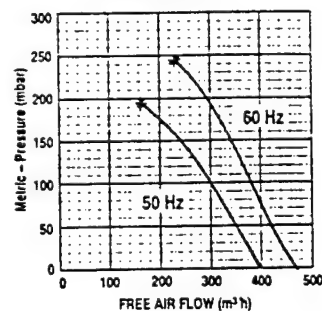
## Model R6P Series

## Model R7 Series

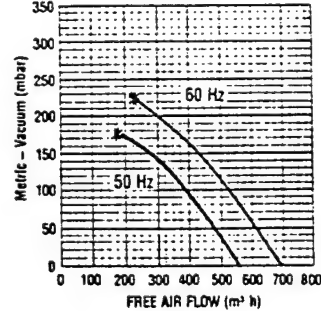
Vacuum



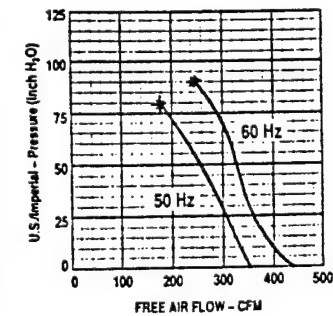
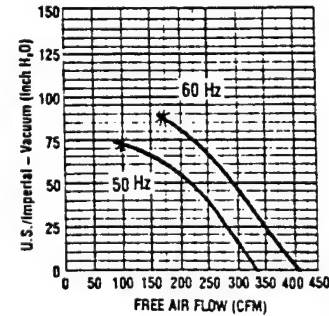
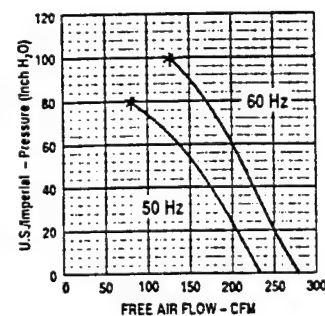
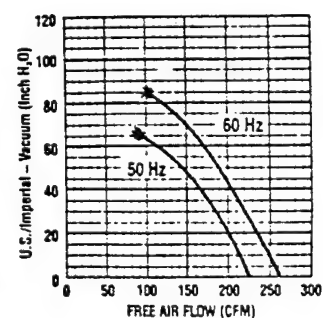
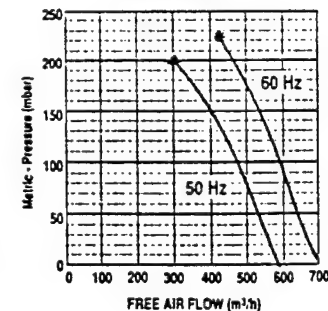
Pressure



Vacuum



Pressure



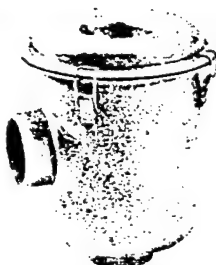
2 3SN



## Blower Accessories

### In-line Filters

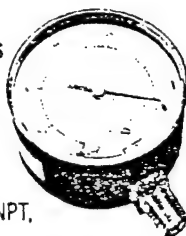
The impeller of a blower passes very close to the housing. It is always wise to have an inlet or in-line filter to ensure troublefree life.



Model No.	R4	R5	R6,R6P	R7
Part No.	AJ151D	AJ151E	AJ151G	AJ151H
Replacement Element	AJ135E	AJ135F	AJ135G	AJ135C
Micron	10	10	10	10

### Vacuum and Pressure Gauges

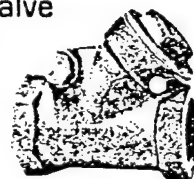
To monitor the system performance so as not to exceed maximum duties. Using two (one on each side of the filter) is a great way to know when the filter needs servicing.



- Vacuum Gauge, Part #AJ497, 2 5/8" Dia., 1/4" NPT, 0-60 in. H<sub>2</sub>O and 0-150 mbar
- Vacuum Gauge, Part #AE134, 2 5/8" Dia., 1/4" NPT, 0-160 in. H<sub>2</sub>O and 0-400 mbar
- Pressure Gauge, Part #AJ496, 2 5/8" Dia., 1/4" NPT, 0-60 in. H<sub>2</sub>O and 0-150 mbar
- Pressure Gauge, Part #AE133, 2 5/8" Dia., 1/4" NPT, 0-160 in. H<sub>2</sub>O and 0-400 mbar
- Pressure Gauge, Part #AE133A, 2 5/8" Dia., 1/4" NPT, 0-200 in. H<sub>2</sub>O

### Horizontal Swing Type Check Valve

Designed to prevent back-wash of fluids that would enter the blower. Also prevents air back-streaming if needed. They can be mounted with their discharge either vertical or horizontal. Valve will open with 3" of water pressure.



Model No.	R4,R5	R6,R6P	R7
Part No.	AH326D	AH326F	AH326G
	1 1/2" NPT	2" NPT	2 1/2" NPT

### Moisture Separator

The purpose of the moisture separator is to remove liquids from the gas stream in a soil vapor extraction process. This helps protect the blower from corrosion and a build up of mineral deposits.

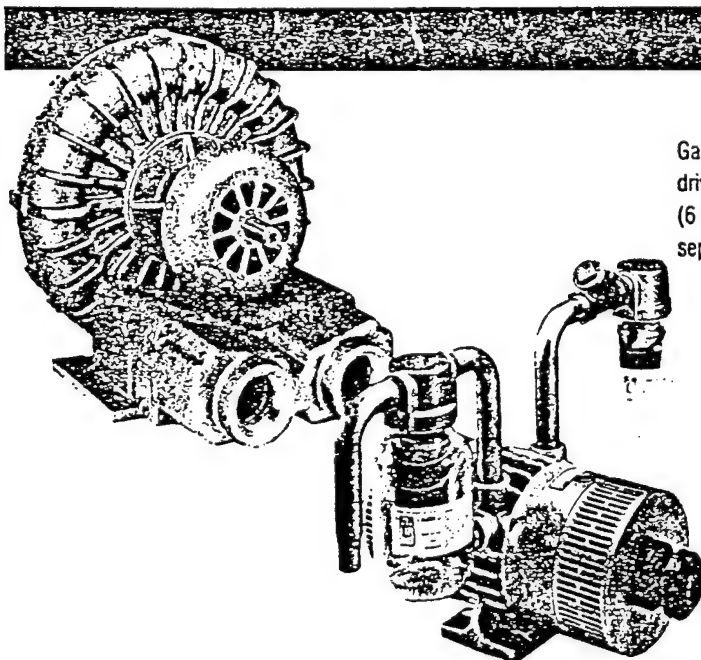
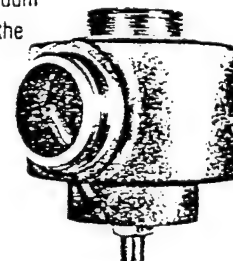


MODEL	LIQUID CAPACITY GALLONS	USED ON
RMS160	10	R4, R4P, R5
RMS200	19	R4, R4P, R5, R6
RMS300	19	R5, R6, R6P
RMS400	40	R6P, R7

### Relief Valve

By setting a relief valve at a given pressure/vacuum you can be assured that no harm will come to the blower or products in your application from excessive duties.

- Pressure/Vacuum Relief Valve, 1 1/2" NPT, Adjustable 30 - 170 in. H<sub>2</sub>O, 200 cfm max. Part #AG258

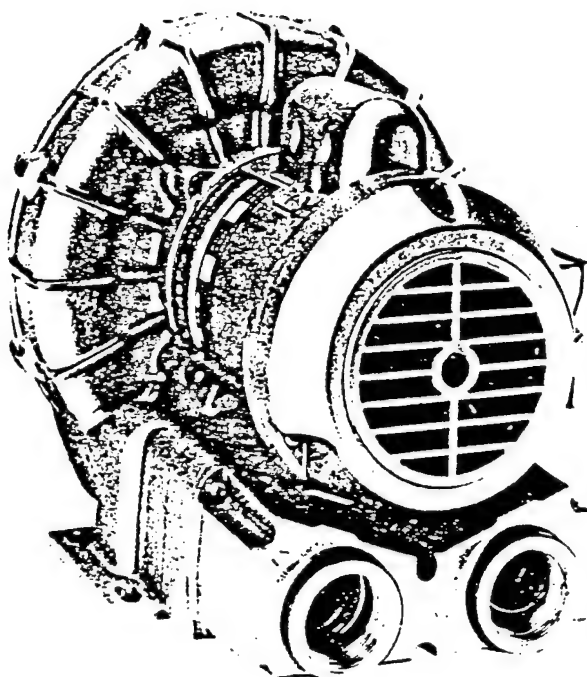


Gast also offers other models that are ideal for soil sparging. Our separate drive blowers are available in 4 sizes to 15 hp, pressures to 170" H<sub>2</sub>O (6 psi). Rotary vane compressors are available in motor mounted or separate drive styles up to 5 hp, pressures to 20 psi.

# Oilless Regenerative Blowers, Motor Mounted to 92 cfm



## REGENAIR® R4 Series



### MODEL R4110-2

52" H<sub>2</sub>O MAX. PRESSURE, 92 CFM OPEN FLOW

### PRODUCT FEATURES

- Oilless operation
- TEFC motor mounted
- Can be mounted in any plane
- Rugged construction/low maintenance
- Can be operated blanked-off

### COMMON MOTOR OPTIONS

- 115/208-230V, 60 Hz; 110/220-240V, 50 Hz, single phase
- 208-230/460V, 60 Hz; 190-230/380-415V, 50 Hz, three phase
- 575V, 60 Hz, three phase

### RECOMMENDED ACCESSORIES

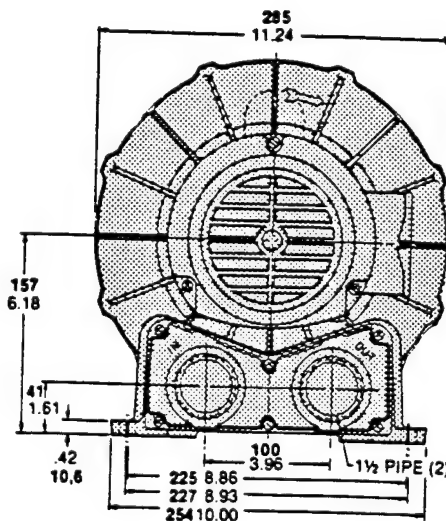
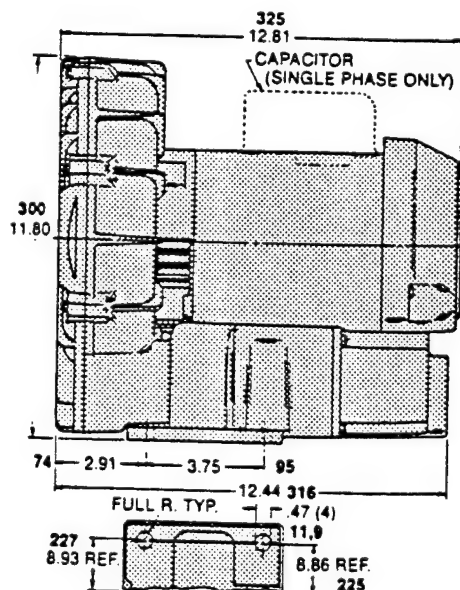
- Pressure gauge AJ496
- Filter AG338
- Muffler AJ121D
- Relief valve AG258

Various brand name motors are used on any model at the discretion of Gast Mfg. Corp.

### Important Notice:

Pictorial and dimensional data is subject to change without notice.

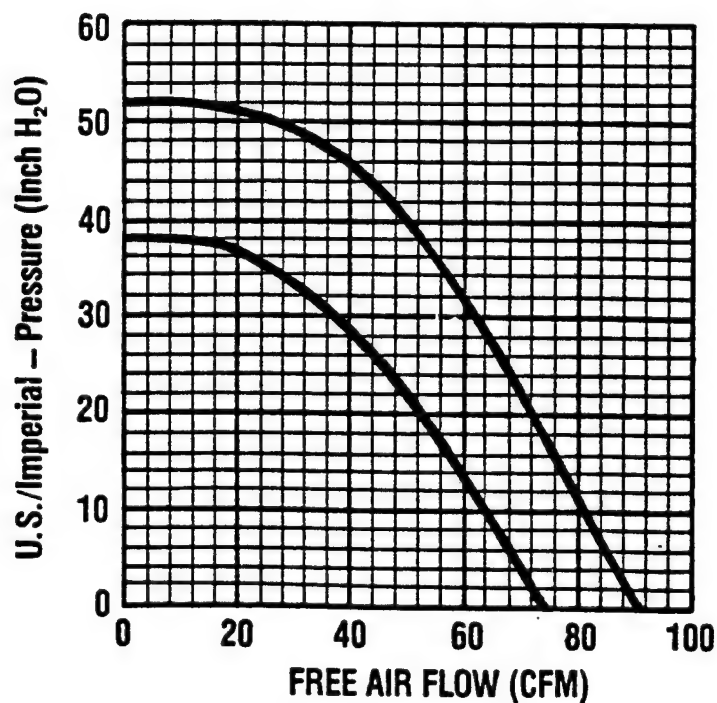
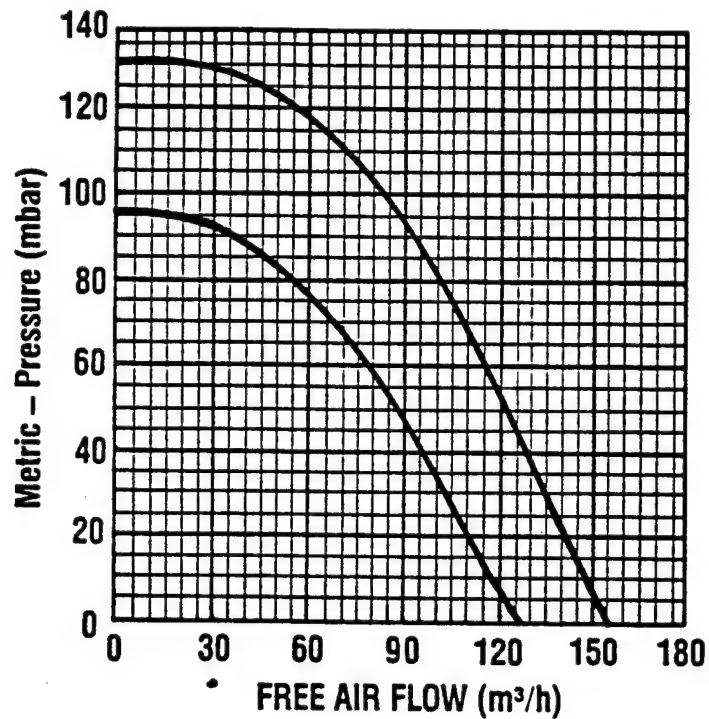
### Product Dimensions Metric (mm) U.S. Imperial (inches)



## Product Specifications

Model Number	Motor Specs	Full Load Amps	HP	RPM	Max Pressure		Max Flow		Net Wt.	
					"H <sub>2</sub> O	mbar	cfm	m <sup>3</sup> /h	lbs.	kg
R4110-2	110/220-240-50-1	9.0/4.5-5.7	0.6	2850	38	95	74	126	41	18,6
	115/208-230-60-1	9.8/5.2-4.9	1.0	3450	52	130	92	156		
R4310A-2	190-220/380-415-50-3	2.6-3.3/1.3-1.4	0.6	2850	38	95	74	126	41	18,6
	208-230/460-60-3	3.4-3.2/1.6	1.0	3450	52	130	92	156		

**Product Performance (Metric U.S. Imperial)** Black line on curve is for 60 cycle performance.  
Blue line on curve is for 50 cycle performance.

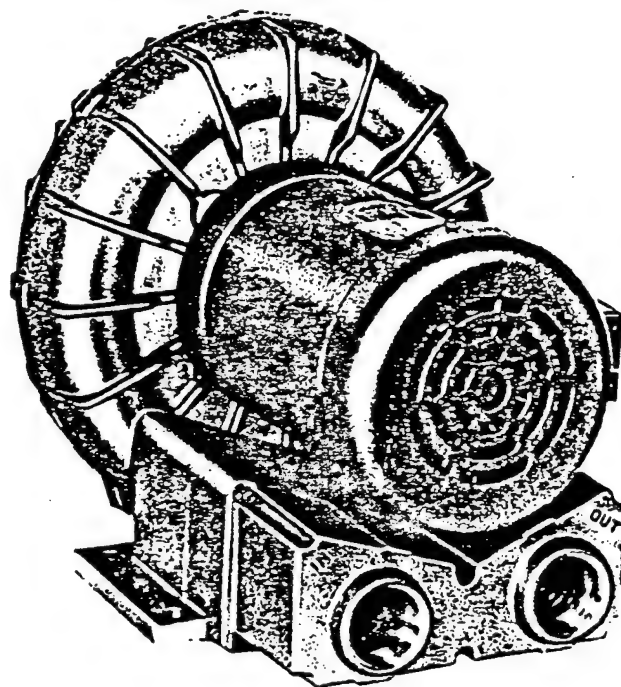


# Oilless Regenerative Blowers, Motor Mounted to 160 cfm



## REGENAIR® R5 Series

PRESSURE



### MODEL R5325A-2

65" H<sub>2</sub>O MAX. PRESSURE, 160 CFM OPEN FLOW

### PRODUCT FEATURES

- Oilless operation
- TEFC motor mounted
- Can be mounted in any plane
- Rugged construction/low maintenance

### COMMON MOTOR OPTIONS

- 115/208-230V, 60 Hz, single phase
- 208-230/460V, 60 Hz; 190-220/380-415V, 50 Hz, three phase
- 575V, 60 Hz, three phase

### RECOMMENDED ACCESSORIES

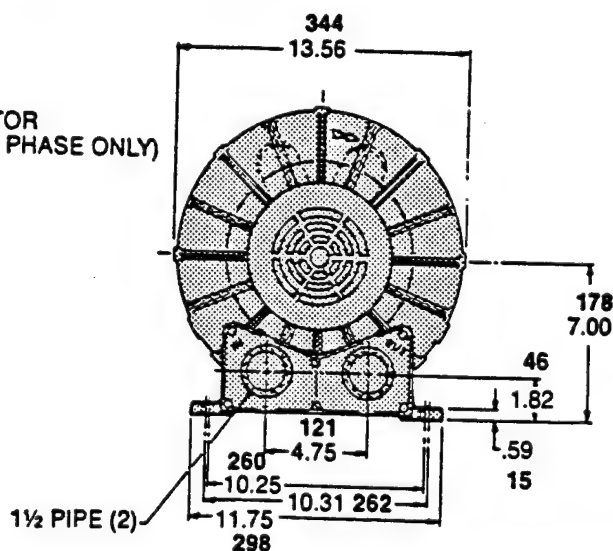
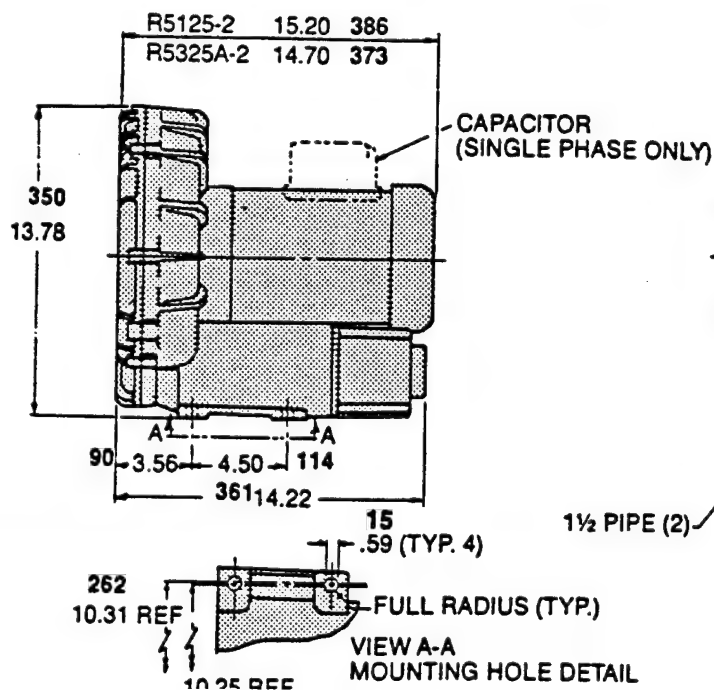
- Pressure gauge AE133
- Filter AG338
- Muffler AJ121D
- Relief valve AG258

Various brand name motors are used on any model at the discretion of Gast Mfg. Corp.

### Important Notice:

Pictorial and dimensional data is subject to change without notice.

### Product Dimensions Metric (mm) U.S. Imperial (inches)

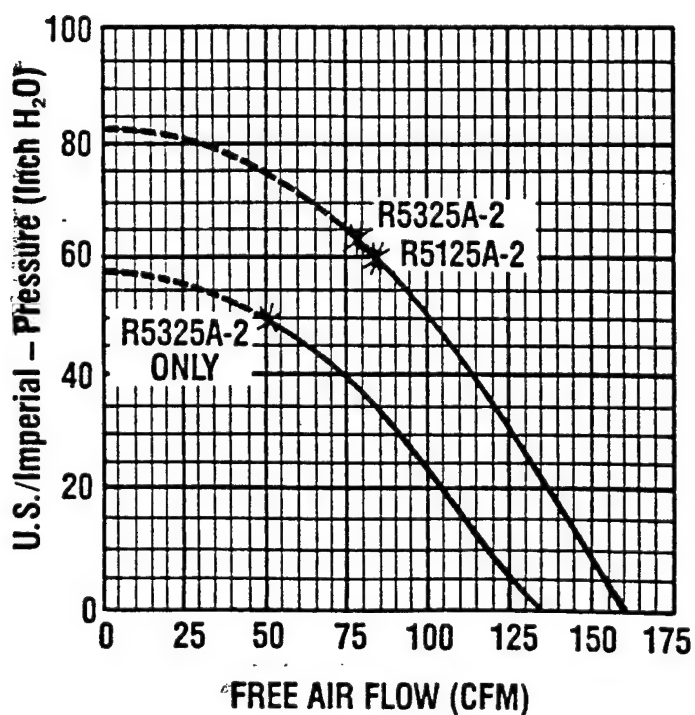
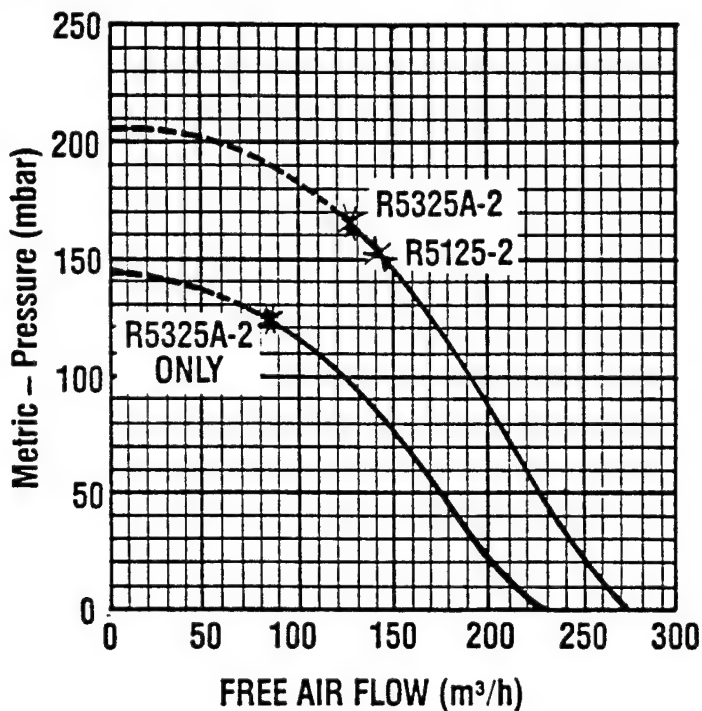




## Product Specifications

Model Number	Motor Specs	Full Load Amps	HP	RPM	Max Pressure		Max Flow		Net Wt.	
					$^{\circ}\text{H}_2\text{O}$	mbar	cfm	$\text{m}^3\text{h}$	lbs.	kg
R5325A-2	190-220/380-415-50-3	6.6-6.7/3.3-3.5	1.35	2850	50	125	133	226	65	29,5
	208-230/460-3	6.9/3.45	2.5	3450	65	162	160	272		
R5125-2	115/208-230-60-1	22.4/12.4-11.2	2.5	3450	60	149	160	272	73	33,1

**Product Performance (Metric U.S. Imperial)** Black line on curve is for 60 cycle performance.  
Blue line on curve is for 50 cycle performance.



\*Recommended maximum duty.  
---- Intermittent duty only.

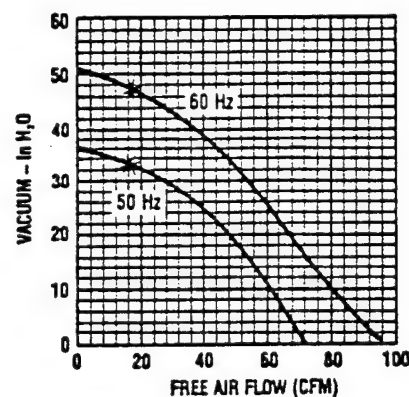
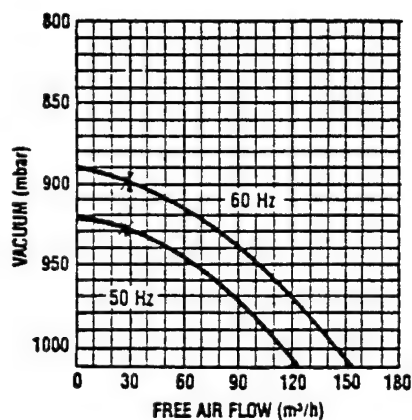
## Product Specifications

Model Number	Hz	Motor Specs	HP	RPM	Max Vac		Max Flow		Net Wt.	
					"H <sub>2</sub> O	mbar	cfm	m <sup>3</sup> /h	lbs.	kg
R4110N-50	50	110/220-240-50-1	0.6	2850	35	924	72	122	60	28
	60	115/208-230-60-1	1.0	3450	48	895	88	150	60	28
R4310P-50	50	220/380-50-3*	0.6	2850	35	924	72	122	58	27
	60	208-230/460-60-3*	1.0	3450	48	895	88	150	58	27
R5125Q-50	60	115/230-60-1*	2.5	3450	60	865	145	246	77	35
R5325R-50	50	190-220/380-415-50-3*	1.85	2850	47	897	120	204	75	34
	60	208-230/460-60-3*	2.50	3450	60	865	145	246	75	34
R6P355R-50	50	190-220/380-415-50-3*	4.5	2850	70	840	235	400	247	112
	60	208-230/460-60-3*	6.0	3450	90	790	260	442	247	112

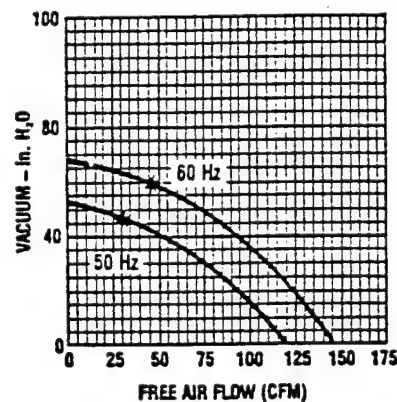
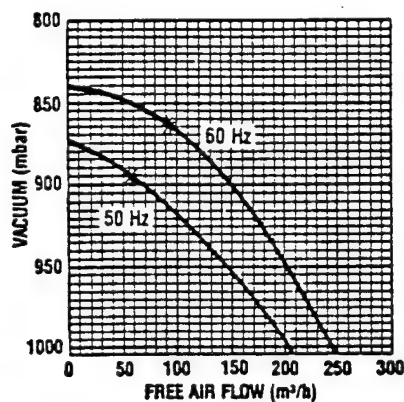
\*Motors do not have thermal protection with automatic reset.

## Product Performance (Metric U.S. Imperial)

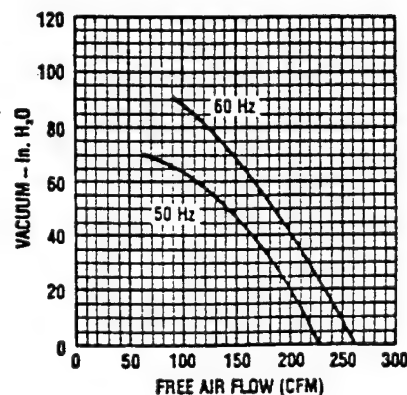
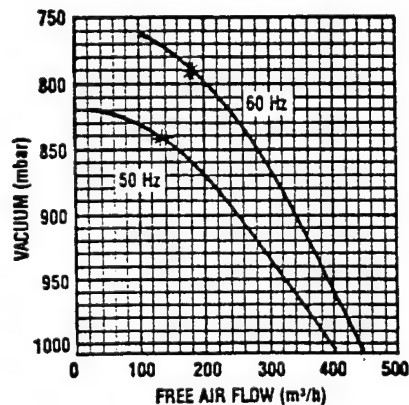
### Model R4 Series



### Model R5 Series



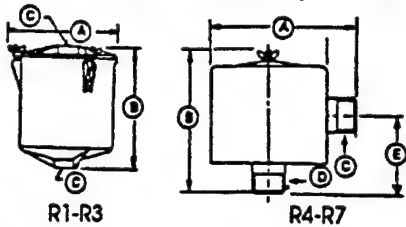
### Model R6P Series



\*Minimum flow permissible through the unit for trouble-free, continuous operation.

# REGENAIR ACCESSORIES

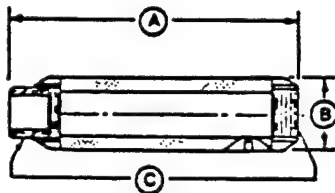
## Inline Filters (for vacuum)



Model Number	R1 & R2	R3	R4, R5 & SDR4	R6P SDR5, SDR6 R6PP, R6PS	R7
Part #	AV460	AV460C	AG337	AJ151G	AJ151H
Dim A	8.25"	8.25"	11.75"	8.00"	16.25"
Dim B	8.875"	8.875"	4.75"	10.25"	27.13"
Dim C	1" FPT	1 1/4" FPT	1 1/2" MPT	2 1/2" MPT	3" MPT
Dim D	-	-	1 1/2" FPT	2 1/2" MPT	3" MPT
Dim E	-	-	2.38	5.50	18.50
Replacement Element	AV469	AV469	AG340	AJ135G	AJ135C
Micron	10	10	25	10	10

MPT = Male Pipe Thread  
FPT = Female Pipe Thread

## Mufflers



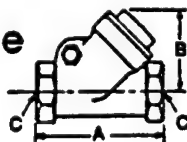
Model Number	R2	R3	R4, R5 SDR 4" & SDR5"	R6, SDR6" R6P R6PP, R6PS	R7
Part #	AJ121B	AJ121C	AJ121D	AJ121E	AJ121G
Dim. A	7.46**	7.94**	12.75**	17.05**	17.44**
Dim. B	2.38"	2.62"	3.25"	3.63"	4.25"
Dim. C	1" NPT	1 1/4" NPT	1 1/2" NPT	2" NPT	2 1/2" NPT

\* For Inlet Only  
\*\* Approximately

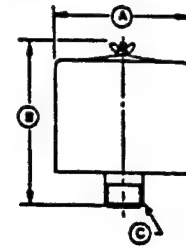
## Fittings

Pipe Size	1"	1 1/4"	1 1/2"	2"	2 1/2"
Tee	BA415	BA431	BA432	BA433	BA434
Common Elbow	BA220	BA244	BA230	BA247	BA248
Nipple	BA752	BA809	BA783	BA810	BA813
Plastic Male Pipe Hose Barb	AJ117A	AJ117B	-	-	-
Hose I.D.	1.25	1.25	-	-	-
Metal Male Pipe Hose Barb	AJ117D	AJ117F	AJ117C	AJ117G	AJ117H
Hose I.D.	1.00	1.25	1.50	2.50	3.00

## Horizontal Swing Type Check Valve



## Inlet Filters (for pressure units only)



Model Number	R1 & R2	R3	R4, R5 & SDR4	R6, SDR5 SDR6, R6P R6PP, R6PS	R7
Part #	AJ126B	AJ126C	AG338	AJ126F	AJ126G
Dim A	6.00"	6.00"	10.63"	10.63"	10.00"
Dim B	4.62**	7.12**	4.81**	4.81**	13.12**
Dim C	1" MPT	1 1/4" MPT	1 1/2" FPT	2" FPT	2 1/2" MPT
Replacement Element	AJ134B	AJ134C	AG340	AG340	AJ135A
Micron	10	10	25	25	10

All are heavy duty for high amounts of particulates. Inlet filters for REGENAIR blowers are drip-proof when mounted as shown.

## Pressure-Vacuum Gauge



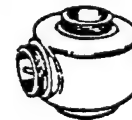
Pressure Gauge, Part #AJ496, 2 5/8" Diameter, 1/4" NPT, 0-60 inches H<sub>2</sub>O and 0-150 mbar

Pressure Gauge, Part #AE133A, 2 5/8" Diameter, 1/4" NPT, 0-200 inches H<sub>2</sub>O and 0-500 mbar

Vacuum Gauge, Part #AJ497, 2 5/8" Diameter, 1/4" NPT, 0-60 inches H<sub>2</sub>O and 0-150 mbar

Vacuum Gauge, Part #AE134, 2 5/8" Diameter, 1/4" NPT, 0-160 inches H<sub>2</sub>O and 0-400 mbar

## Relief Valve



Pressure/Vacuum Relief Valve, Part #AG258, 1 1/2" NPT, Adjustable 30-170 inches H<sub>2</sub>O. 200 CFM maximum

Silencer for Relief Valve, Part #AJ121D

Model Number	R1, R2	R3	R4, R5 SDR 4" & SDR5	R6, SDR6 R6P R6PP, R6PS	R7
Part #	AH326B	AH326C	AH326D	AH326E	AH326G
Dim. A	3.57	4.19	4.50	5.25	8
Dim. B	2.32	2.69	2.94	3.82	5.07
Dim. C	1" NPT	1 1/4" NPT	1 1/2" NPT	2" NPT	2 1/2" NPT

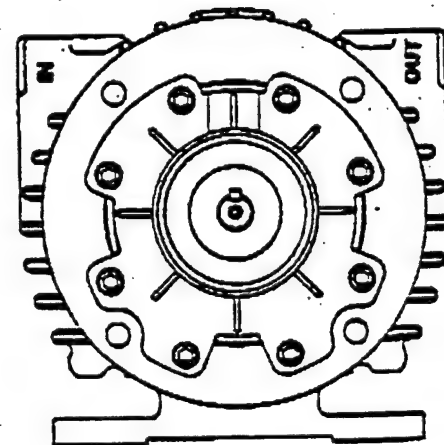
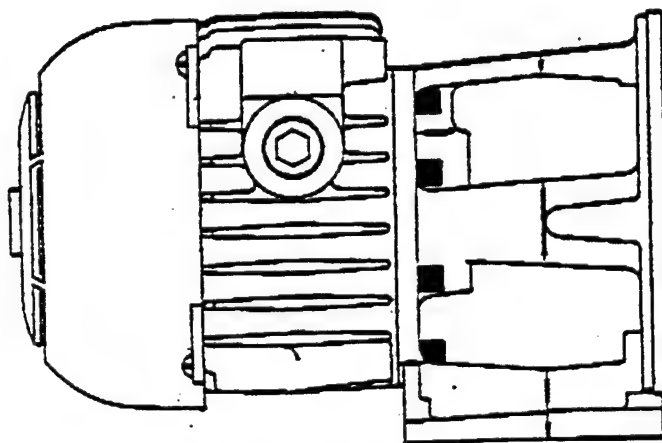
**APPENDIX B**  
**ROTARY-VANE BLOWER INFORMATION**

70-230  
G360PL  
7-89

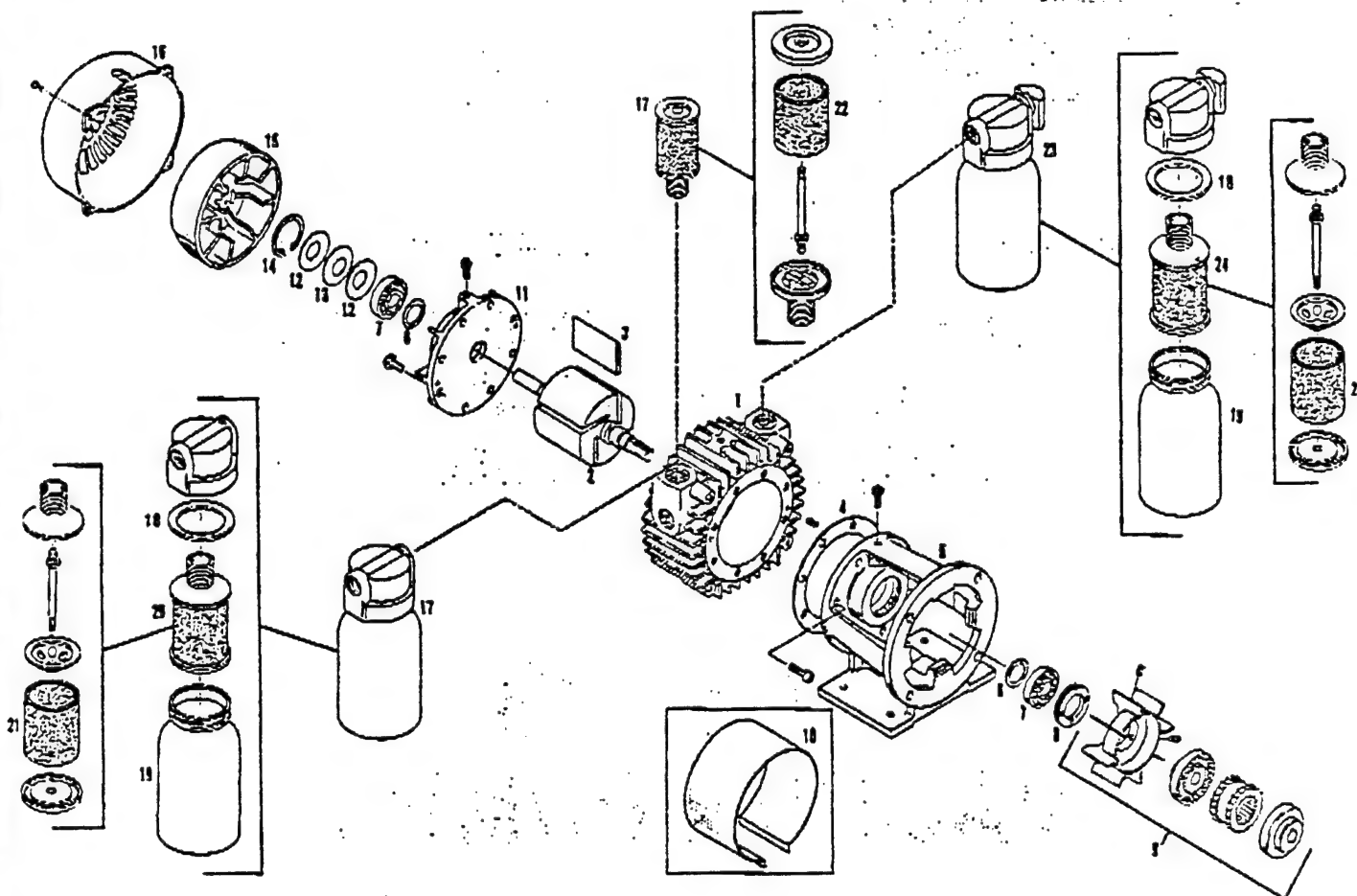
MANUFACTURING CORPORATION  
P. O. BOX 97, BENTON HARBOR, MICHIGAN 49022  
PHONE 616-926-6171

**PARTS LIST and OPERATING  
INSTRUCTIONS  
1067, 2067, and 2567**

**OIL LESS  
VACUUM PUMPS  
and  
COMPRESSORS**



**WARNING: UNIT SHOULD NOT PUMP EXPLOSIVE GASES OR  
BE USED IN EXPLOSIVE AMBIENTS.**



REF. NO.	DESCRIPTION	PART QNTY.	1067-V103	1067-P102	2067-V103	2067-P102	2567-V103	2567-P102
1	Body	1	AH348	AH348	AH181	AH181	AH300	AH333
2	Rotor Assembly	1	AH428	AH428	AH182	AH182	AH192	AH192
3	Valve	4	AH430	AH430	AH190	AH190	AH195	AH195
4	Body Gasket	1	AH587	AH587	AH587	AH587	AH587	AH587
5	Fuel Strainer	1	AH208	AH208	AH208	AH208	AH208	AH208
6	Deflector	2	AH183	AH183	AH183	AH183	AH183	AH183
7	Ball Bearing (Drive & Dead)	2	AC394	AC394	AC394	AC394	AC394	AC394
8	End Cap, Drive	1	AB339A	AB339A	AB339A	AB339A	AB339A	AB339A
9	Fan Coupling Assembly	1	AH198	AH198	AH198	AH198	AH198	AH198
10	Fan Guard	1	AH194	AH194	AH194	AH194	AH194	AH194
11	End Flange Gasket	1	AH205	AH205	AH205	AH205	AH205	AH205
12	Retainer Springs	2	AB337	AB337	AB337	AB337	AB337	AB337
13	Washer	1	AB338	AB338	AB338	AB338	AB338	AB338
14	Snap Ring	1	AB335	AB335	AB335	AB335	AB335	AB335
15	Fan	1	AC3268	AC3268	AC3268	AC3268	AC3268	AC3268
16	Fan Guard	1	AC1028	AC1028	AC1028	AC1028	AC1028	AC1028
17	Intake Filter Assembly	1	AA800C	AA800F	AA800D	AA800D	AA800D	AA800D
18	Gasket	2	AA408		AA408		AA408	
19	Jet	2	AA401		AA401		AA401	
20	Filter Assembly	1	AC435-1		AC435-1		AC435-1	
21	Cartridge	2	AC393	AC393	AC393		AC393	
22	Filter Felt	1		D3448		D3448		D3448
23	Muffler	1	AA800F		AA800F		AA800F	
24	Muffler Assembly	1	AC434-1		AC434-1		AC434-1	
	Service Kit		K336	K336	K336	K357	K350	K357

• Denotes parts in service kit.  
When corresponding or ordering spare parts, please give complete model and serial numbers.

# OPERATING AND MAINTENANCE INSTRUCTIONS

**CONSTRUCTION:** The end plate, body, rotor and foot bracket are all cast iron. Consequently any moisture that accumulates in the pump will tend to corrode the interior especially if it stands idle. The vanes are made of hard carbon and are precision ground. They should last 5,000 to 10,000 hours depending upon the degree of vacuum pressure at which the pump is run.

**STARTING: CAUTION: NEVER LUBRICATE THIS OILLESS AIR PUMP.** The carbon vanes and grease packed motor bearings require no oil. If the motor fails to start or slows down when under load shut the unit off and unplug. Check that the supply voltage agrees with the motor post terminals and the motor data name plate. **CAUTION: ALL DUAL VOLTAGE MOTORS ARE SHIPPED FROM THE FACTORY WIRED FOR THE HIGH VOLTAGE.** If the pump is extremely cold allow it to warm to room temperature before starting. If anything appears to be wrong with the motor return the complete pump to an authorized Gast service facility.

To minimize noise and vibration the unit should be mounted on a solid surface that will not resonate. Use of shock mounts or vibration isolation material is recommended. Inlet or discharge noise can be minimized by attaching the muffler. The unit should not be allowed to operate in ambient air temperatures in excess of 40°C (104°F). If the motor fails to start or slows down when under load shut the unit off and unplug. Check that the supply voltage agrees with the motor post terminal setup and the motor data name plate.

**FILTRATION:** Care must be taken to insure that any particles (dirt, chips, foreign material) often found in new plumbing not be allowed to enter the unit. Liquid, moisture vapor, or oil based contaminants will affect pump performance and must be filtered from entering the pump.

Dirty filters restrict air flow and if not corrected could lead to possible motor overload, poor performance and early pump failure. Check filters periodically and clean when necessary by removing felts and washing in Gast flushing solvent (part number AH255). Dry with compressed air and replace.

**FLUSHING:** Should excessive dirt, foreign particles, moisture, or oil be permitted to enter the pump the vanes

will act sluggish or even break. Flushing the pump should remove these materials. First remove the filter & muffler clean with solvent & dry with compressed air.

**DISASSEMBLY:** Begin by removing the fan guard and fan. The dead end plate may be removed using a wheel puller. The vanes and body area can then be inspected for damage or further cleaning. Unless scoring is visible do not remove drive end plate and top clearance will be maintained. If further repair is required remove the spanner nut before using a wheel puller to remove the drive end plate. Both bearings are a press fit on the shaft.

**REASSEMBLY:** First attach the drive end plate (but do not tighten bolts) and press the bearing on the shaft (be sure to properly support the inner race). If required top clearance (between rotor & body) should then be set (for 1067 models it is .0015 and for 2067 and 2567 it is .003). Now replace the dead end plate and bearing. Then the bellville springs, washer and snap ring should be replaced. With a dial indicator on the dead end shaft to show any movement, install spanner nut (with adhesive to keep from vibrating loose) until indicator moves .002-.0025. Check shaft for ease of rotation.

## HAZARD PREVENTION:

**WARNING: MAKE SURE THE ELECTRIC MOTOR IS PROPERLY GROUNDED AND THE WIRING IS DONE BY A QUALIFIED ELECTRICIAN FAMILIAR WITH NEMA MG2 SAFETY STANDARDS, NATIONAL ELECTRIC CODE AND ALL LOCAL SAFETY CODES.**

**WARNING: THE ELECTRIC MOTOR MAY BE THERMALLY PROTECTED AND WILL AUTOMATICALLY RESTART WHEN THE PROTECTOR RESETS.**

**WARNING: WHEN SERVICING ALL POWER TO THE MOTOR MUST BE DE-ENERGIZED AND DISCONNECTED. ALL ROTATING COMPONENTS MUST BE AT A STAND STILL.**

**WARNING: DO NOT USE KEROSENE OR OTHER COMBUSTIBLE SOLVENTS OR OPERATE PUMP IN EXPLOSIVE AMBIENTS.**

Performance Data

Model	Vacuum			Maximum Vacuum
	0" HG	10" HG	20" HG	
1067	8.5 CFM	5.0 CFM	2.0	26" HG
2067	16.0	9.0	3.0	27"
2567	20.0	13.0	5.0	27"

Model	Pressure			
	0 PSI	5 PSI	10 PSI	15 PSI
1067	8.5 CFM	7.5 CFM	7.0 CFM	6.5 CFM
2067	17.0	14.0	12.0	11.0
2567	21.0	19.0	17.0	16.0

Gast Manufacturing Co., Ltd.  
Coronation Road, Cressex Estate  
High Wycombe, Bucks HP12 3SN  
England 23571  
FAX 444-943-6588

Gast Manufacturing Corp.  
2550 Meadowbrook Road  
Benton Harbor MI 49022  
616/926-6171  
FAX 616-925-8288

Gast Manufacturing Corp.  
505 Washington Ave.  
Carlstadt NJ 07072  
201/933-8484  
FAX 201-933-5545

Brenner-Fiedler & Assoc.  
13824 Bendley Place  
Cerritos, Ca. 90701  
213-404-2721  
FAX 213-404-7975

Wainbee, Ltd.  
121 City View Drive  
Rexdale, Ontario, Canada M9W 5A9  
416/243-1900  
FAX 416-243-2336

Wainbee, LTD.  
215 Brunswick Blvd.  
Pointe Claire, Montreal  
Canada H9R 4R7  
514/697-8810  
FAX 514-697-3070

Note: All general correspondence should be directed to Gast Mfg Corp, P.O. Box 97, Benton Harbor, MI 49022



# ACCESSORIES

## CHECK VALVES—vacuum

AE236	1/4" NPT, male
AJ350	1/4" NPT, female
AJ550A	3/4" NPT, female

## CHECK VALVES—vacuum swing

AH325A	3/4" NPT
AH325B	1" NPT

## CORDS—ELECTRIC

AA816	1/2" 1/2" 3/4" hp, 115V without switch, 10 ft.
AA818	1/2" 3/4" hp, 230V without switch, 10 ft.
AA826	1/2" 1/4" 1/2" hp, 115 V with switch, 10 ft.

## FILTERS—no jar

AC432	3/4" female NPS, 10 m micron
AC433	1/2" male NPS, 10 m micron
AC435	3/4" male NPS, 10 micron
AA508F	3/4" female NPS, 50 micron
AA508F	1/2" male NPS, 50 micron
AA505G	3/4" male NPS, 50 micron
BD30A	1/4" male NPS, 50 micron
BD43B	1/2" male NPS, 50 micron
AD750	1" male NPS, 50 micron

## FILTERS—glass jar

AA817B	1/2" NPS, 2 oz., 50 micron
AA822H	1/4" NPS, 3/4" oz., 50 micron
AD540	1" NPS, 2 qt., 50 micron
AB830	3/4" NPS, 1 qt., 10 micron
AD599D	3/4" NPS, 1 qt., 50 micron
AB900	1/2" NPS, 1 qt., 50 micron
AB900F	1/2" NPS, 1 qt., 10 micron
AB901B	3/4" NPS, 1 qt., 10 micron
AB901C	3/4" NPS, 1 qt., 50 micron
AA800C	1/2" NPS, 1 qt., 10 micron
AA800E	1/2" NPS, 1 qt., 50 micron
AA800D	3/4" NPS, 1 qt., 10 micron
AA800J	3/4" NPS, 1 qt., 50 micron
V4003	1/4" NPS, 8 oz., 50 micron
V500D	3/4" NPS, 8 oz., 50 micron
V400C	1/4" NPS, 8 oz., 50 micron

## FILTERS—metal jar

AB608D	1/2" NPS, 1/2 qt., 10 micron
AB612	1/2" NPS, 1/2 qt., 10 micron
AB608B	3/4" NPS, 1/2 qt., 10 micron
AB608	1/2" NPS, 1/2 qt., 50 micron
AB608	3/4" NPS, 1/2 qt., 50 micron
AB650C	3/4" NPS, 1 qt., 10 micron
AB650B	3/4" NPS, 1 qt., 50 micron
AB608	1/2" NPS, 1 qt., 50 micron
AB608B	1/2" NPS, 1 qt., 10 micron

## FILTERS—plastic jar

AA822H	1/4" NPS, 3/4" oz.
V400H	1/4" NPS, 8 oz.
V500H	3/4" NPS, 8 oz.

## FLUSHING SOLVENT

AH255	1 qt.
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## FOOT SUPPORT ASSEMBLIES

AC136	0211, 0322, 0522
AE240	1/4" 1/4" hp piston pumps
AE241	1/2" 1/4" hp piston pumps
AE245	1/2" hp piston pumps

## GAUGES—pressure

AA642	1/4" NPS, 0-30 psi
AA644B	1/4" NPS, 0-30 psi 0-2000"
AA608	1/4" NPS, 0-100 psi (back mount)
AA607	1/4" NPS, 0-100 psi (back mount)
AP503	1/4" NPS, 0-100 psi, heavy duty (bottom mount)

## GAUGES—vacuum

AA640	1/4" NPS, 0-30" Hg, 0-760 mm Hg
AA641	1/4" NPS, 0-30" Hg

## HANDLES—carrying

AP553	for 1/2" and 3/4" hp units
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## MUFFLERS—glass jar

AB398B	3/4" NPS, 1 qt., 10 micron, for oil-less pumps
AB600C	1/2" NPS, 1 qt., 50 micron, for oil-less pumps
AB600J	1/2" NPS, 1 qt., 50 micron, for oil-less pumps
AD540	1" NPS, 2 qt., 50 micron
AB608	1" NPS, 2 qt., 50 micron, with fitting for quieter operation
AA900F	3/4" NPS, 1 qt., 10 micron, for oil-less pumps
AA900B	3/4" NPS, 1 qt., 50 micron, for oil-less pumps
AA922B	1/2" NPS, 3/4" oz., 50 micron, for oil-less pumps
AA922B	same as AA922 but with silencing tube
AA917F	1/2" NPS, 2 oz., 50 micron, for oil-less pumps

## MUFFLERS—metal jar

AB612A	1/2" NPS, 1/2 qt., 10 micron
AB608B	1/2" NPS, 1/2 qt., 10 micron
AB608A	3/4" NPS, 1/2 qt., 10 micron
AB608C	1/2" NPS, 1 qt., 10 micron
AB650D	3/4" NPS, 1 qt., 10 micron

## MUFFLERS—plastic jar

AA922P	1/2" NPS, 3/4" oz.
V425M	1/2" NPS, 8 oz.
V525G	3/4" NPS, 8 oz.

## OVERLOADS—motor

External thermal protector, specify motor number and make

## PAINT

AE564A	Flat blue-gray, 16 oz. aerosol can
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## RELIEF VALVES—pressure

AA203	1/4" NPS, flow below 2 cfm
AA206	1/4" NPS, flow below 2 cfm
AA800	3/4" NPS, flow below 10 cfm
AA307	3/4" NPS, flow above 10 cfm
AF570S	1/4" NPS, 0-100 psi
AF730	1/4" NPT, 0-100 psi
AE900	1" NPT, 0-100 psi

## RELIEF VALVES—vacuum

AA204	1/4" NPS, flow below 2 cfm
AA207	1/4" NPS, flow below 2 cfm
AA840A	3/4" NPS, flow from 2-15 cfm
AA308	3/4" NPS, flow above 10 cfm
AE981	1" NPS, for 4363, 3565

## SWITCH—vacuum

AE265	1/4" NPS
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## TRAPS—vacuum

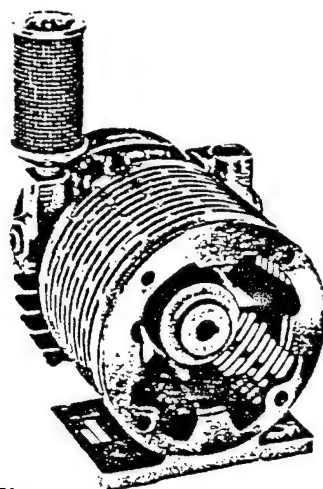
AA673	1/4" NPS, 8 oz.
AA673B	1/4" NPS, 2 oz.
AA675C	1/4" NPS, 2 oz.

## TROUBLE SHOOTING GUIDE FOR ROTARY VANE PUMPS

REASONS FOR PROBLEM	Low		High		Pump Overheating	Motor Overload
	Vac.	Press.	Vac.	Press.		
Filter dirty	X	X	at pump		X	X
Muffler dirty		X		at pump	X	X
Vac. line collapsed	X		at pump		X	X
Relief valve set too high			X	X	X	X
Relief valve set too low	X	X				
Plugged vacuum or pressure line	X	X	at pump	at pump	X	X
Vanes sticking	X	X				
Running at too high RPM			X	X	X	X
Vanes worn (replace)	X	X				
Shaft seal worn (replace)	X	X				
Dust or offset powder in pump	X	X			X	X
Motor not wired correctly	X	X			X	



## Oilless 1067, 2067, 2567 Series



### MODEL 1067 SERIES

15 PSI MAX. PRESSURE, 8.50 CFM OPEN FLOW

### MODEL 2067 SERIES

15 PSI MAX. PRESSURE, 17.00 CFM OPEN FLOW

### MODEL 2567 SERIES

15 PSI MAX. PRESSURE, 21.00 CFM OPEN FLOW

### PRODUCT FEATURES

- Oilless operation
- Close coupled easy motor mounting
- Rugged construction/low maintenance
- Essentially pulse free service

### INCLUDES

- Filter AA905F (1067), AA905G (2067/2567)
- Fan/coupling assembly AH198
- Fan guards AC102C, AH194

### RECOMMENDED ACCESSORIES

- Pressure relief valve AA600 (1067), AA307 (2067/2567) (U.S. version)
- Pressure gauge AA644B (U.S. version)
- Repair kit K356 (1067)
- Repair kit K350 (2067/2567)

### Important Notice:

Pictorial and dimensional data is subject to change without notice.

### EUROPEAN MODEL Product Dimensions

Metric (mm)

Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1067	195	100	144	72	288	180	102	11	125	165	241	142	19	80
2067	195	100	144	72	289	180	102	11	125	165	284	164	19	80
2567	195	100	144	72	289	180	102	11	125	165	284	164	19	80

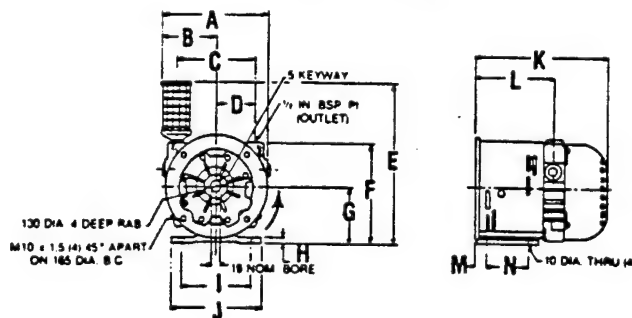
### U.S. MODEL

Product Dimensions Metric (mm) U.S. Imperial (inches)

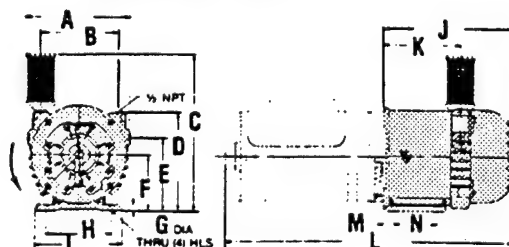
Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1067	195	145	287	180	132	102	11	124	165	241	142	495	21	76
1067	7.69	5.69	11.31	7.09	5.19	4.0	.44	4.88	6.50	9.50	5.59	19.50	.84	3.00
2067	194	145	287	180	132	102	11	124	165	284	164	584	21	76
2067	7.63	5.69	11.31	7.09	5.19	4.0	.44	4.88	6.50	11.19	6.44	23.00	.84	3.00
2567	194	145	287	180	132	102	11	124	165	284	164	584	21	76
2567	7.63	5.69	11.31	7.09	5.19	4.0	.44	4.88	6.50	11.19	6.44	23.00	.84	3.00

Dimensions for reference only.

### METRIC MODEL



### U.S./IMPERIAL MODELS NEMA 56, C FACE



INLET  
2067/2567 1/4 IN. BSP.  
1067 1/2 IN. BSP.

INLET  
2067/2567 1/4 NPT  
1067 1/2 NPT

## Product Specifications

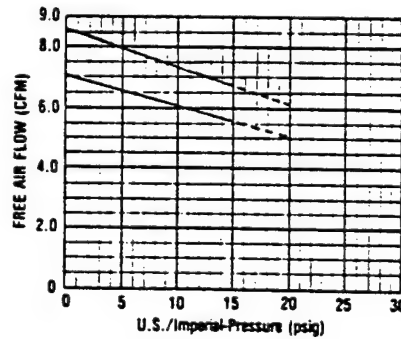
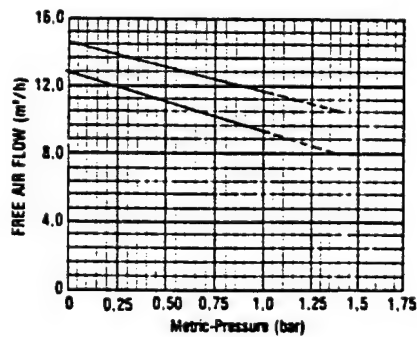
Model Number	Motor	RPM		HP	kW	Net Wt.	
		60 cycle	50 cycle			lbs.	kg
1067-P102	Not included	1725	1425	1	0,75	34	15,40
1067-P104 (metric)	Not included	1725	1425	1	0,75	34	15,40
†1067-P106-G561X (like 1067-P102 plus motor)	110/220-240; 115/208-230; 50/60-1	1725	—	1	0,75	65	29,5
2067-P102	Not included	1725	1425	1	0,75	47	21,3
2067-P104 (metric)	Not included	1725	1425	1	0,75	47	21,3
†2067-P106-G561X (like 2067-P102 plus motor)	110/220-240; 115/208-230; 50/60-1	1725	—	1	0,75	92	41,7
2567-P102	Not included	1725	1425	2	1,5	46	20,9
2567-P104 (metric)	Not included	1725	1425	2	1,5	46	20,9
2567-P106-G475 (like 2567-P102 plus motor)	230/460-60-3	1725	—	2	1,5	81	36,8

†Motor includes Thermotector.

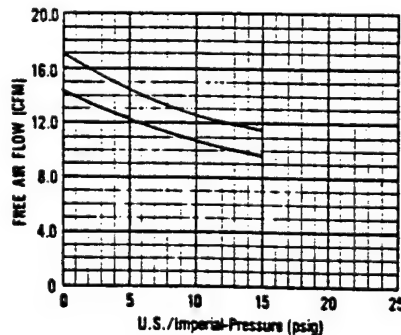
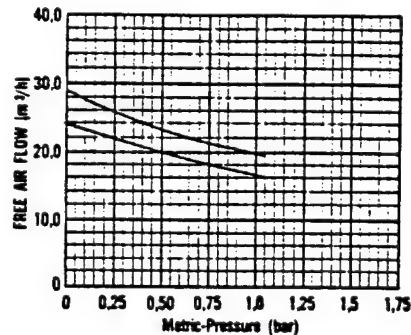
## Product Performance (Metric U.S. Imperial)

Black line on curve is for 60 cycle performance.  
Blue line on curve is for 50 cycle performance.

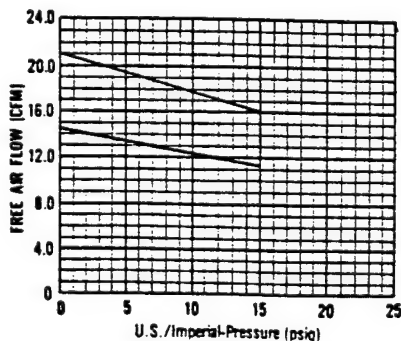
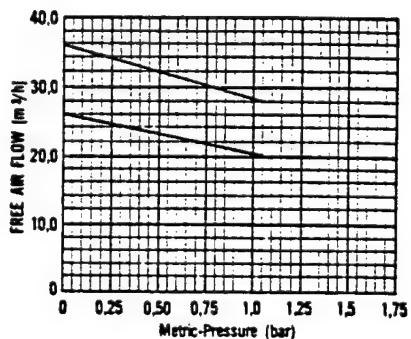
### Model 1067



### Model 2067



### Model 2567



**APPENDIX C**  
**DATA COLLECTION SHEETS**







**Location:** \_\_\_\_\_

Ex:

**NOTE:** Once a month, this sheet must be FAXed to: Fred Stanin, Engineering—Science, (510) 769-9244.





**APPENDIX C**  
**CHAIN OF CUSTODY FORMS**

# CHAIN OF CUSTODY RECORD

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**WORK**

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(S. Thomas Taylor)

SW 8045 (PH)	A 408 (ALKA)	SW 7340 (HOM)	SW 844 (MO87)	SW 8030 (BTR)	SW 8118 (THPT)	SW 8212 (TKN)	SW 8663 (PHO8)	SW 8745 (CART)
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NOTIFY PACK 48 HOURS PRIOR

[illegible]

Reanalyzed by: (Signature) <i>S. Thomas Taylor</i>	Date / Time 10/22 12:00	Rechecked for Laboratory by: (Signature)	Date / Time	Reanalyzed
Reanalyzed by: (Signature)	Date / Time	Rechecked for Laboratory by: (Signature)	Date / Time	Reanalyzed

Q - Quinacridone, G - Guanine, R - Rosin

Mr. Robert G. Galt, President, Capital Hill Construction / Hill Firm  
 Federal Express Number: \_\_\_\_\_  
 Address Number: \_\_\_\_\_

**ENGINEERING-SCIENCE, INC.**  
 1760 Broadway, Suite 909 • Denver, Colorado  
 (303) 831-9108



## CHAIN OF CUSTODY RECORD

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**COPIES**



## Page \_\_\_\_\_ of \_\_\_\_\_

CCFRA19







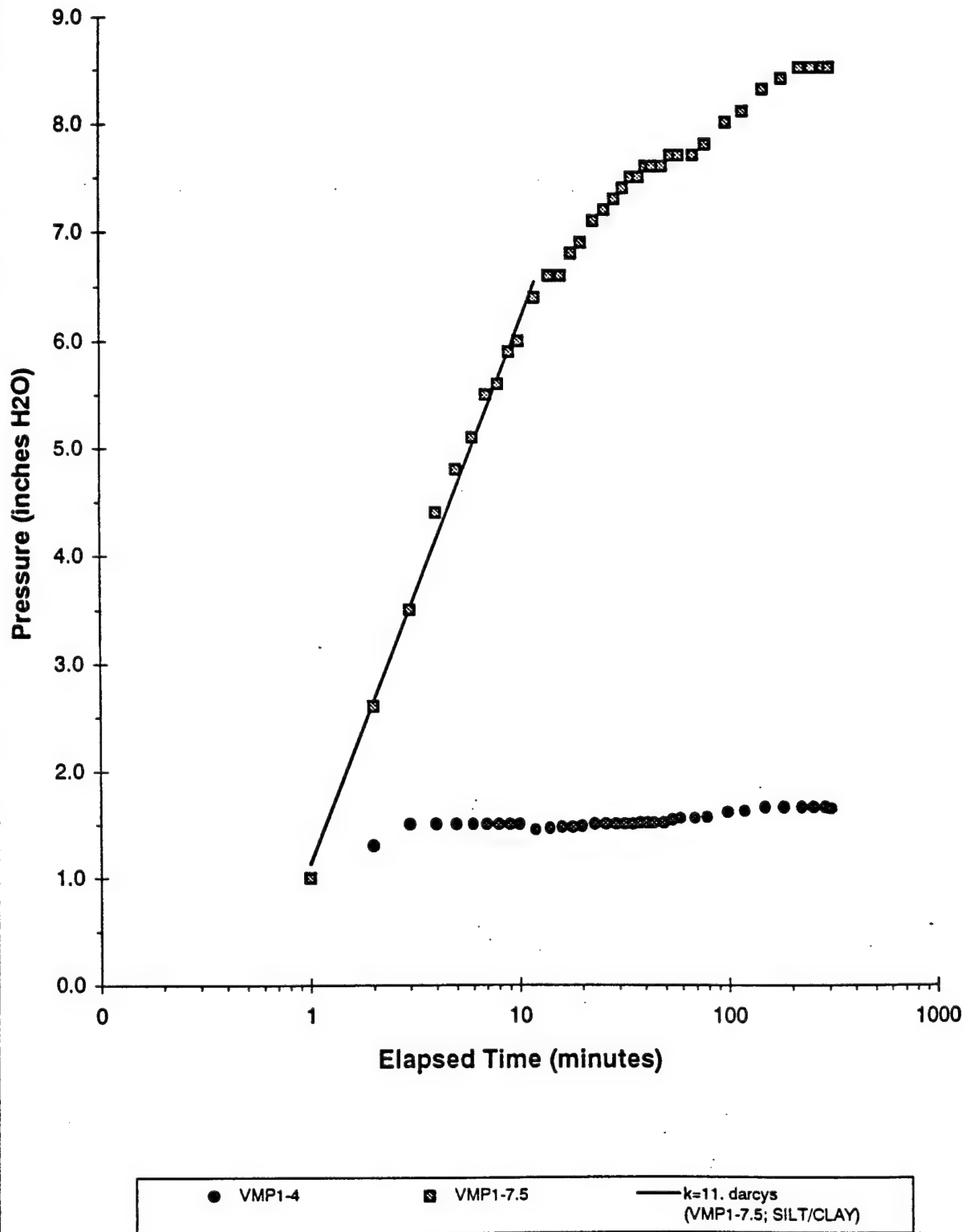
## Page 1 of 1

[illegible]

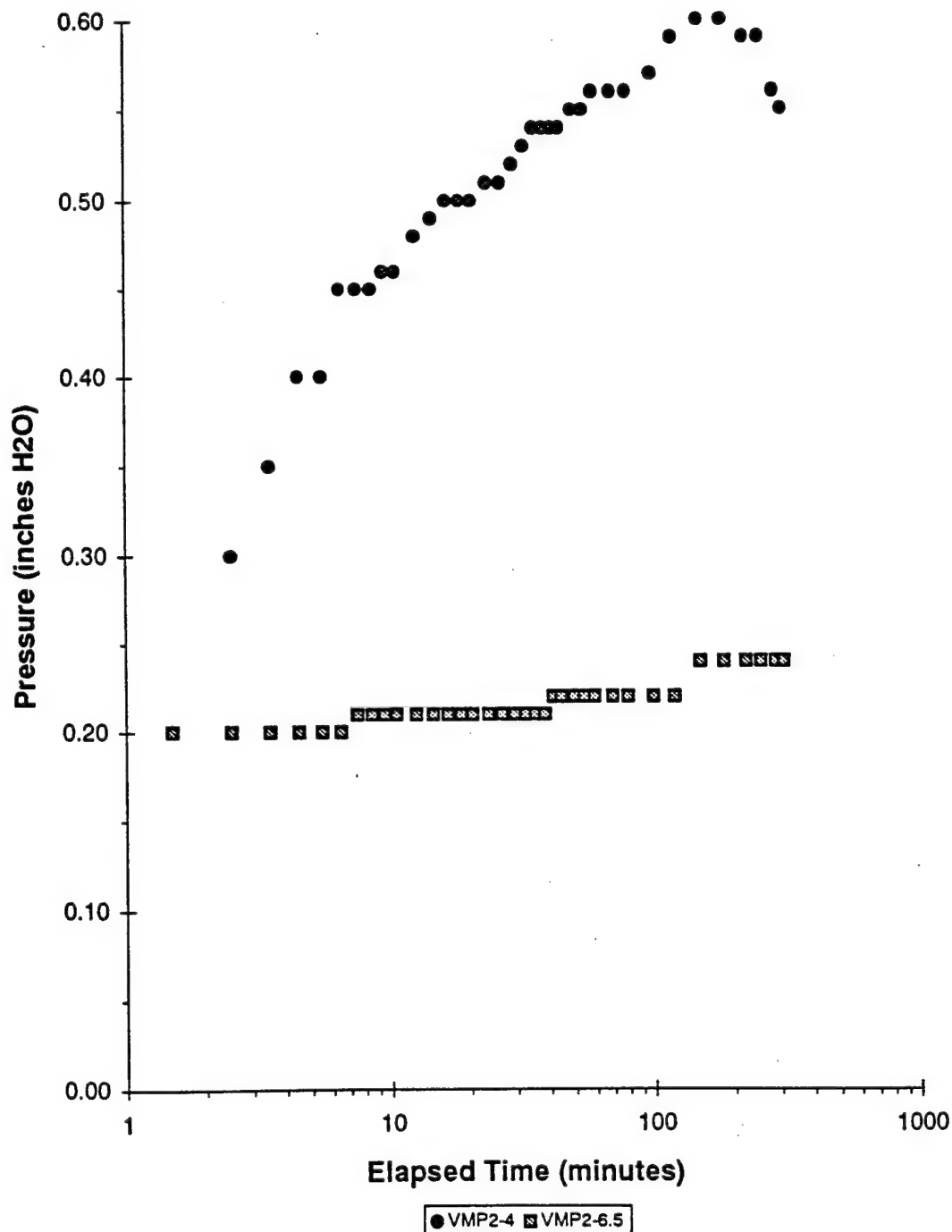
**APPENDIX D**

**AIR PERMEABILITY TEST RESULTS**

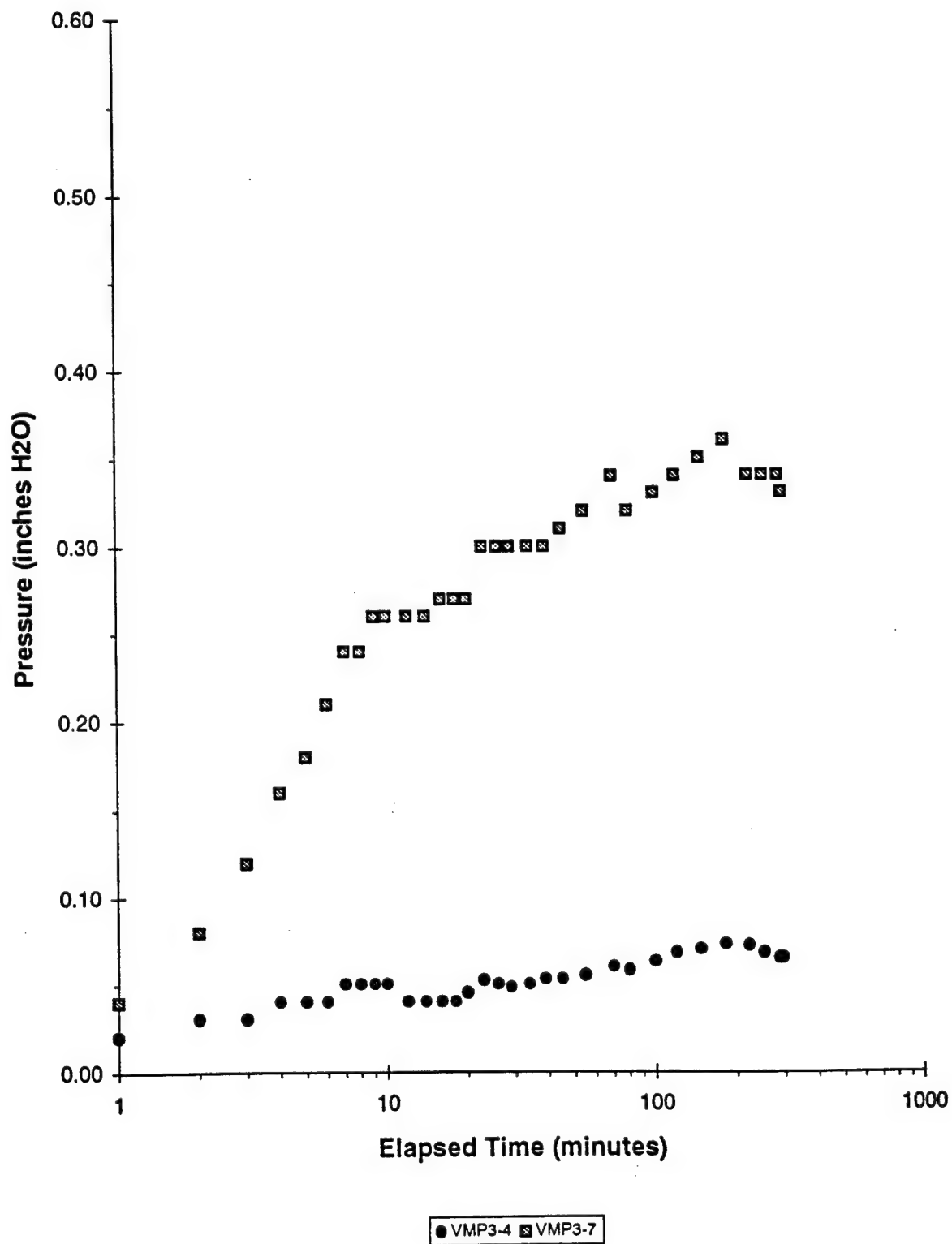
**Air Permeability Test**  
**VMP1-4 & VMP1-7.5; radius = 11.5 feet**  
**PS-2 - Fairchild AFB, Washington**



**Air Permeability Test**  
**VMP2-4 & VMP2-6.5; radius = 20 ft**  
**PS-2 - Fairchild AFB, Washington**

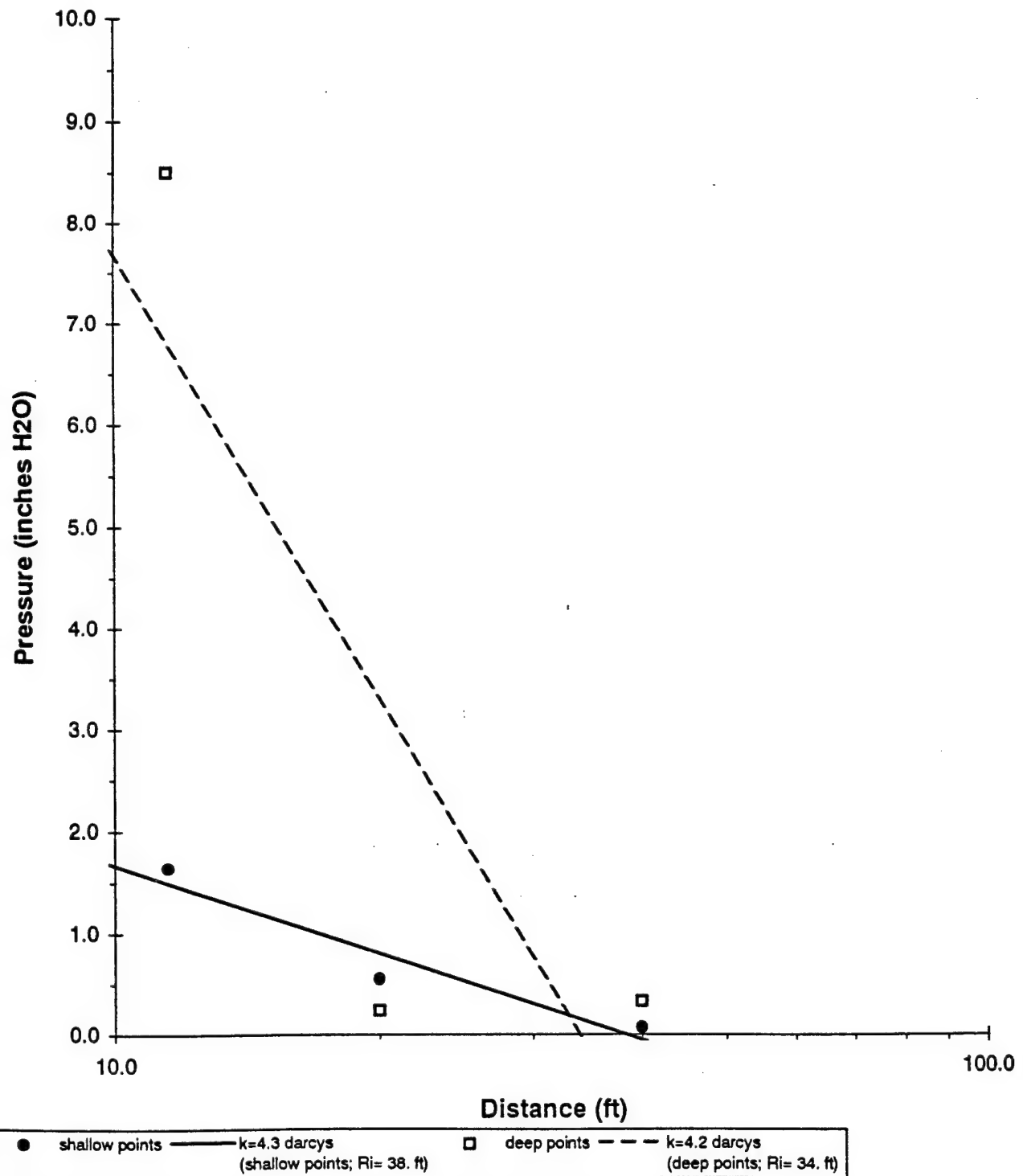


**Air Permeability Test**  
**VMP3-4 & VMP3-7; radius = 40 feet**  
**PS-2 - Fairchild AFB, Washington**

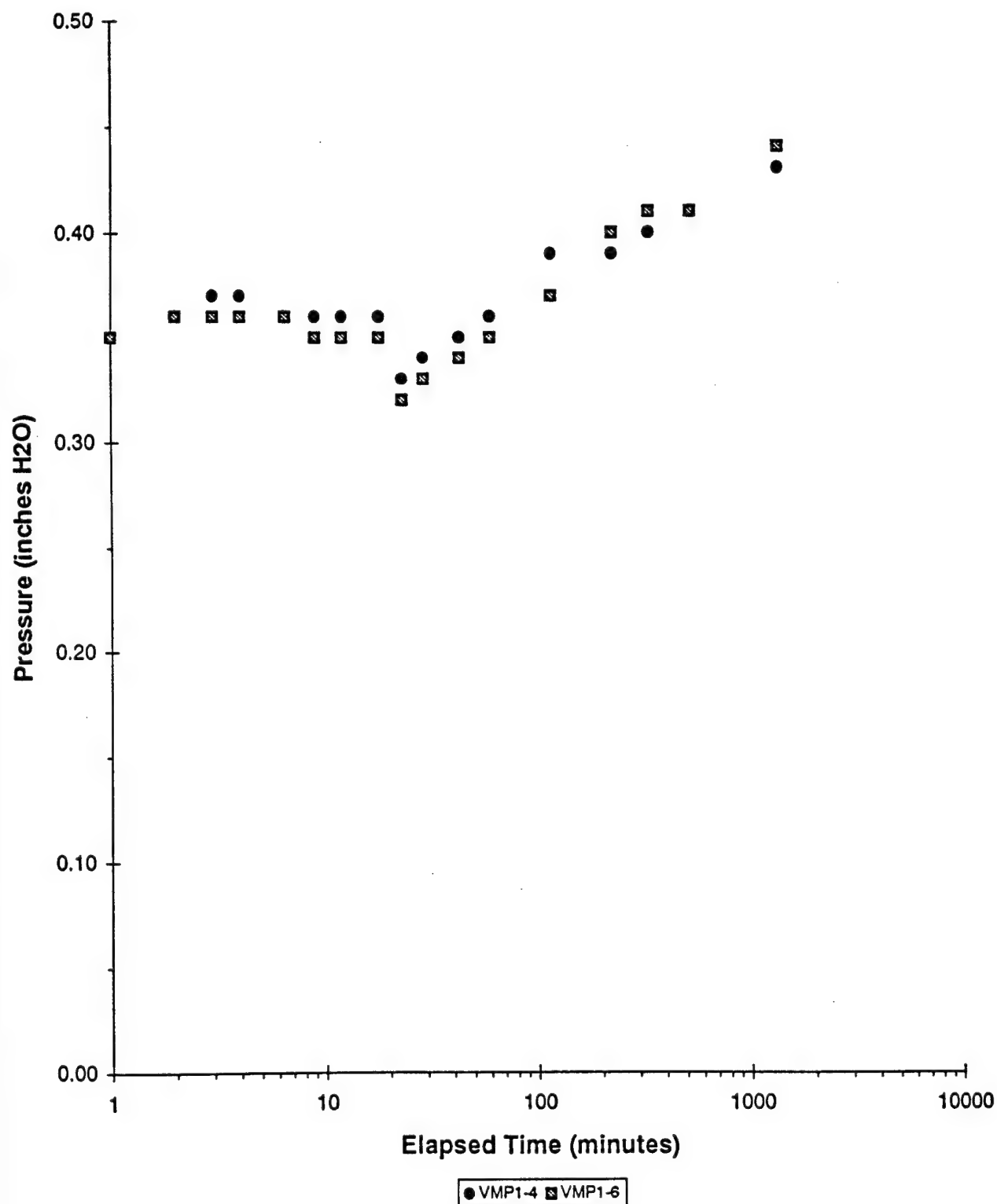




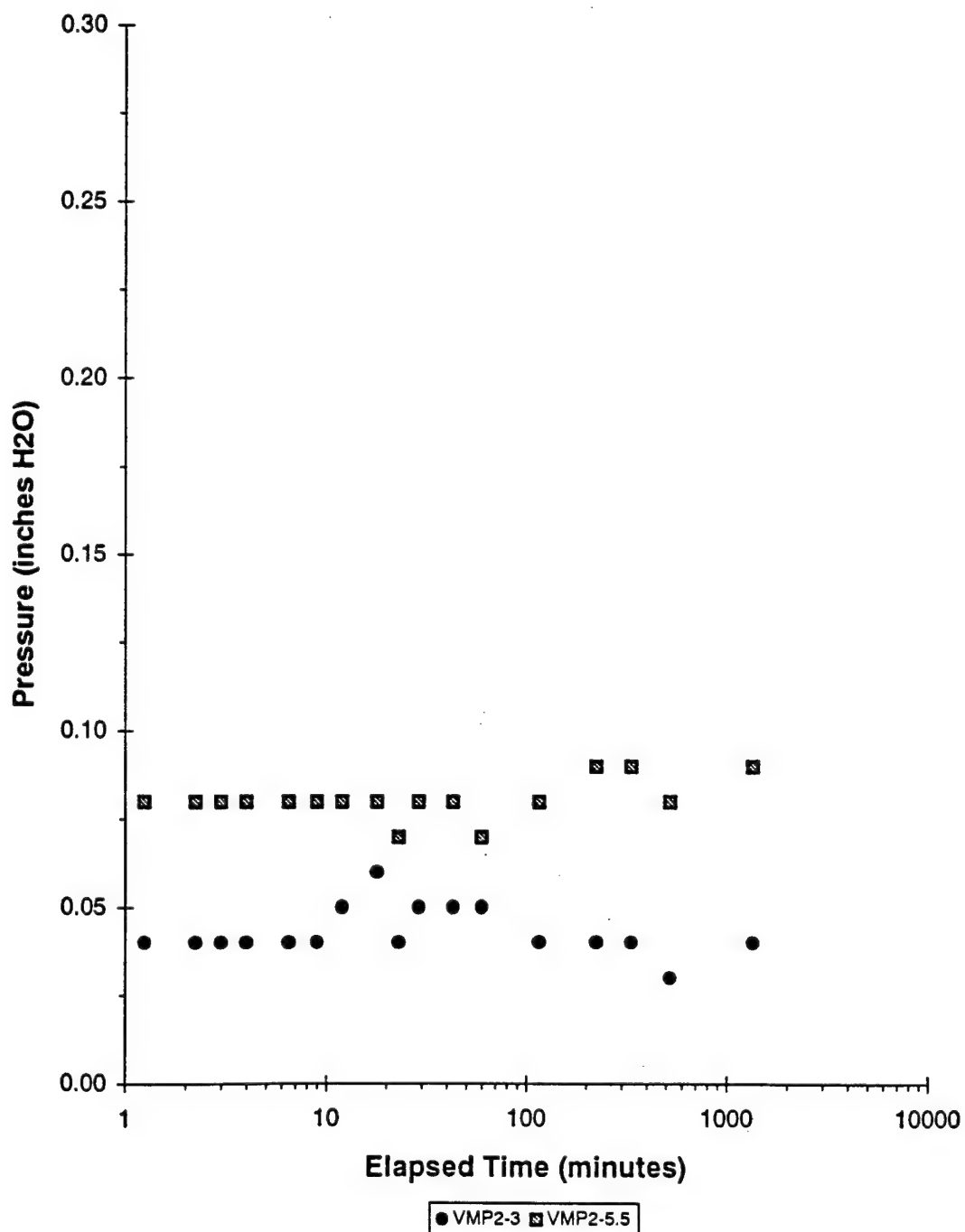
**Air Permeability Test**  
**Steady-state Calculation Method**  
**PS-2 - Fairchild AFB, Washington**



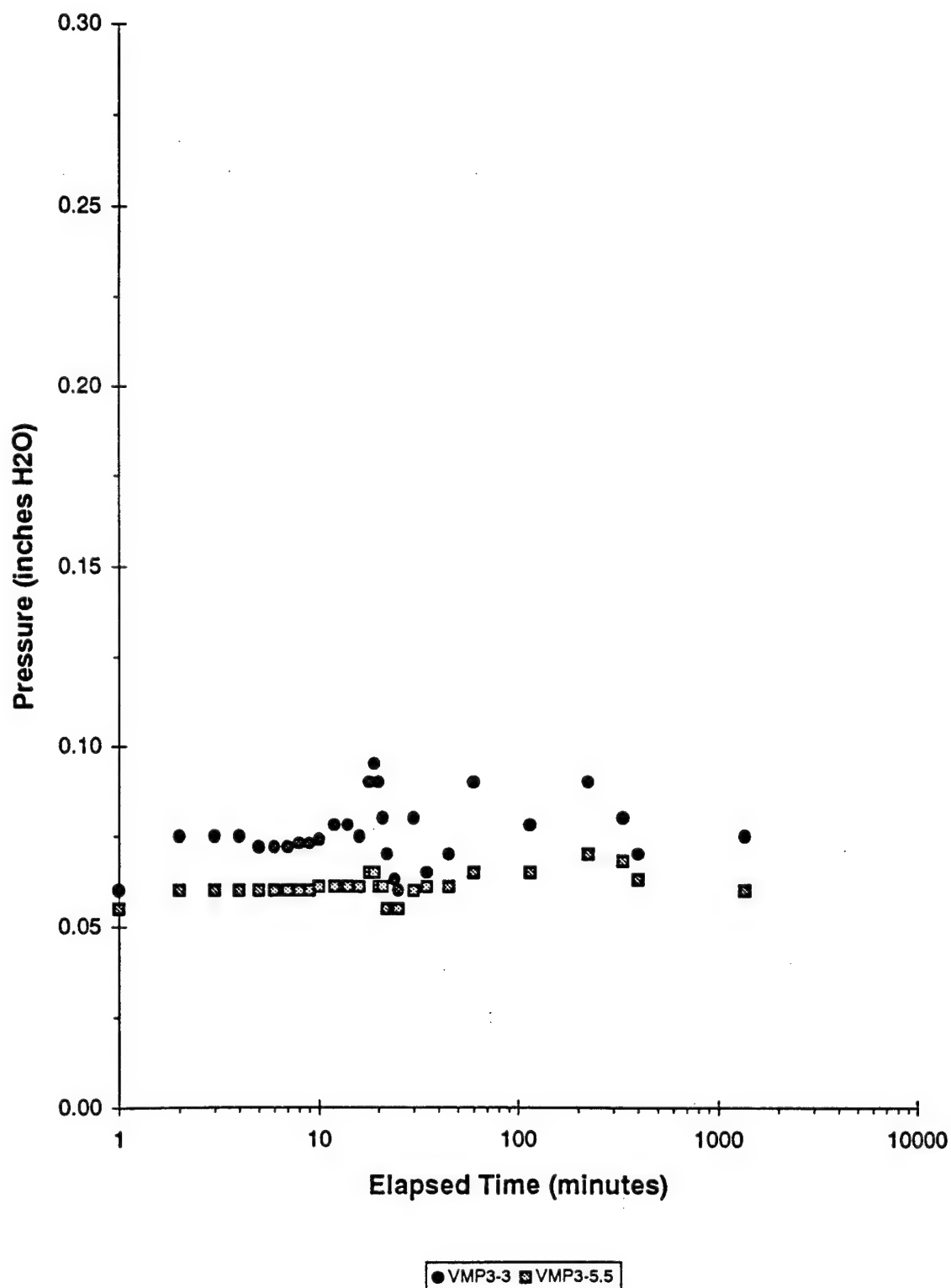
Air Permeability Test  
VMP1-4 & VMP1-6; radius = 10 feet  
PS-1A - Fairchild AFB, Washington



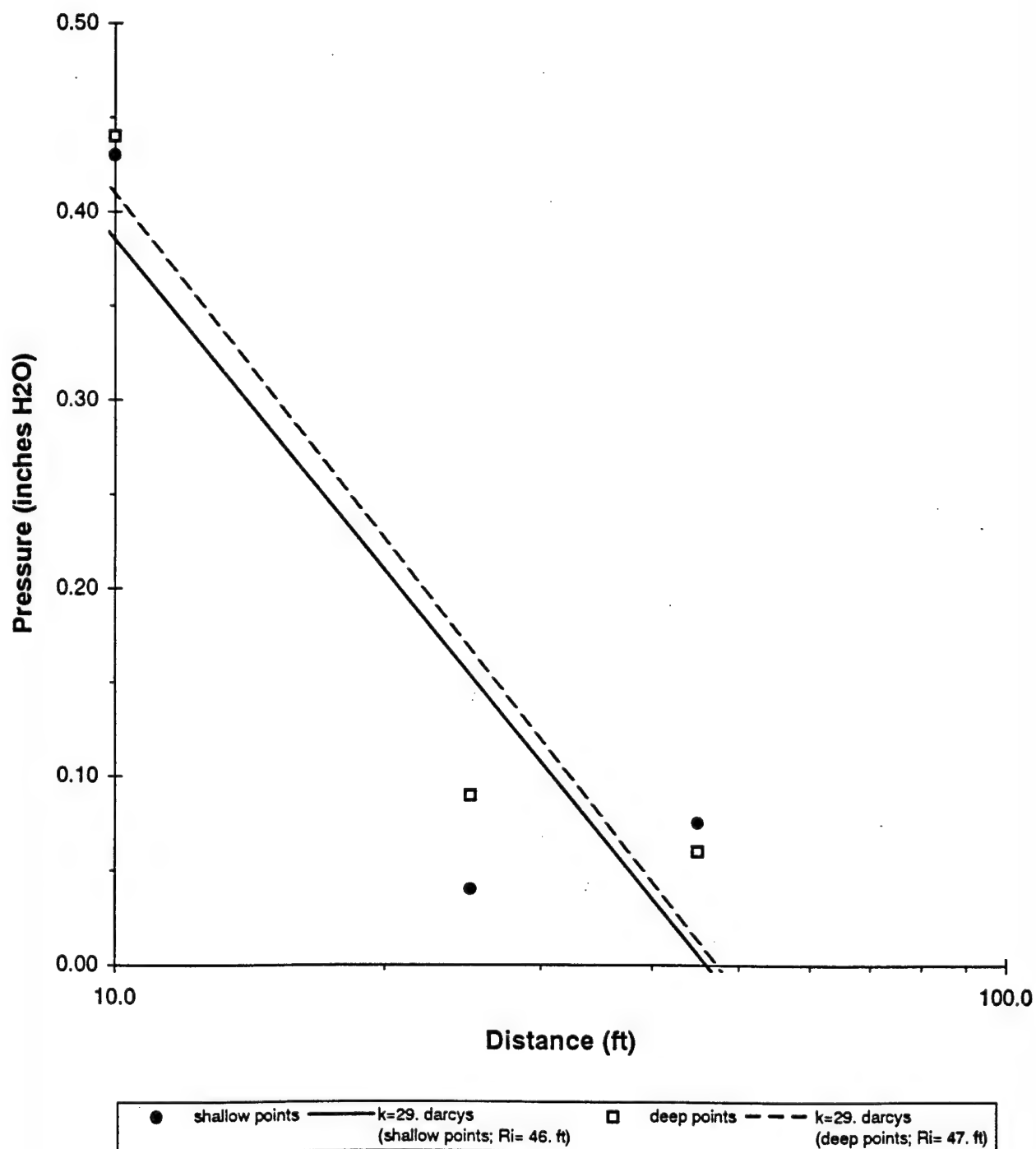
**Air Permeability Test**  
**VMP2-3 & VMP2-5.5; radius = 25 ft**  
**PS-1A - Fairchild AFB, Washington**



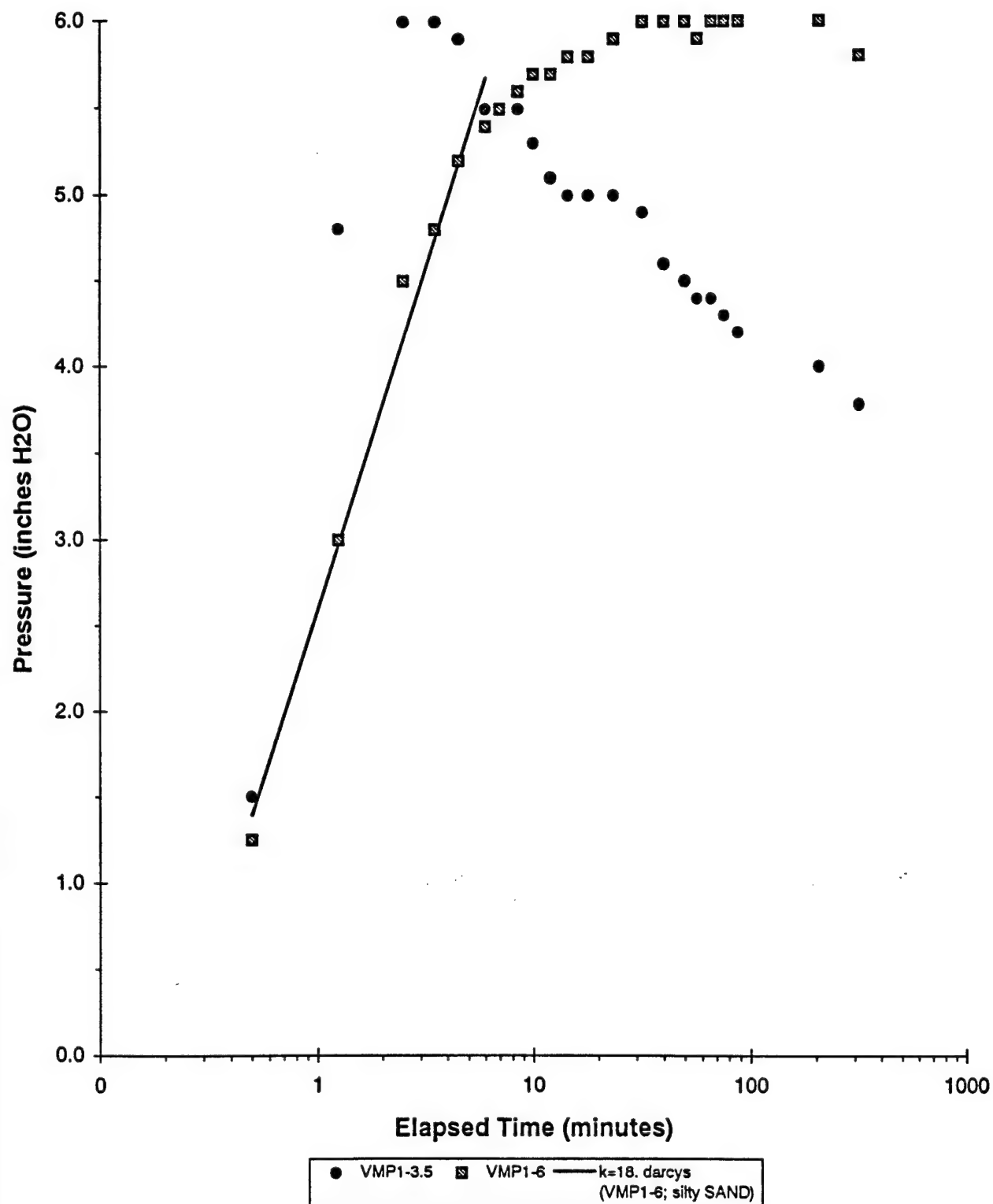
**Air Permeability Test**  
**VMP3-3 & VMP3-5.5; radius = 45 feet**  
**PS-1A - Fairchild AFB, Washington**



**Air Permeability Test**  
**Steady-state Calculation Method**  
**PS-1A - Fairchild AFB, Washington**

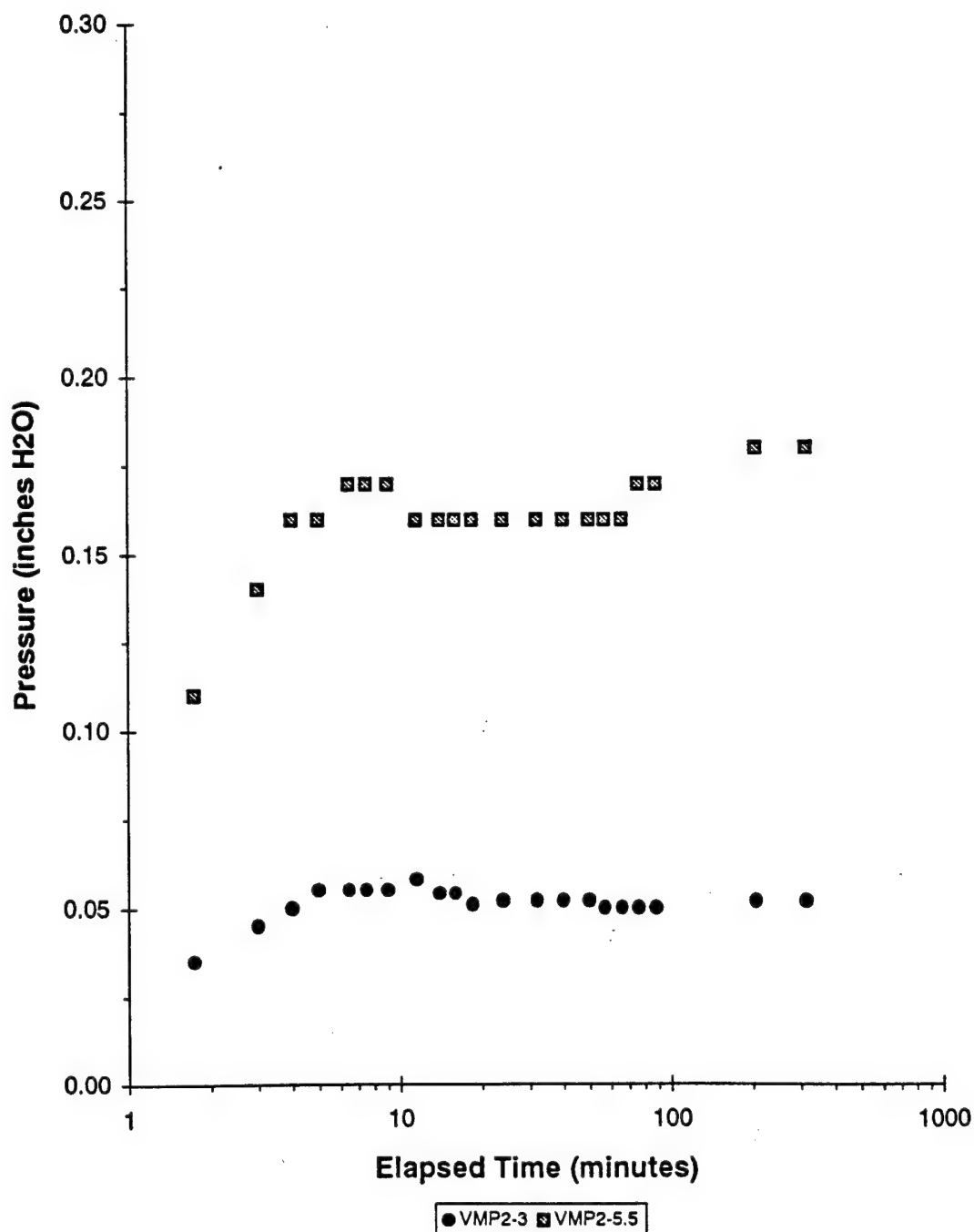


Air Permeability Test  
VMP1-3.5 & VMP1-6; radius = 10 feet  
PS-1B - Fairchild AFB, Washington

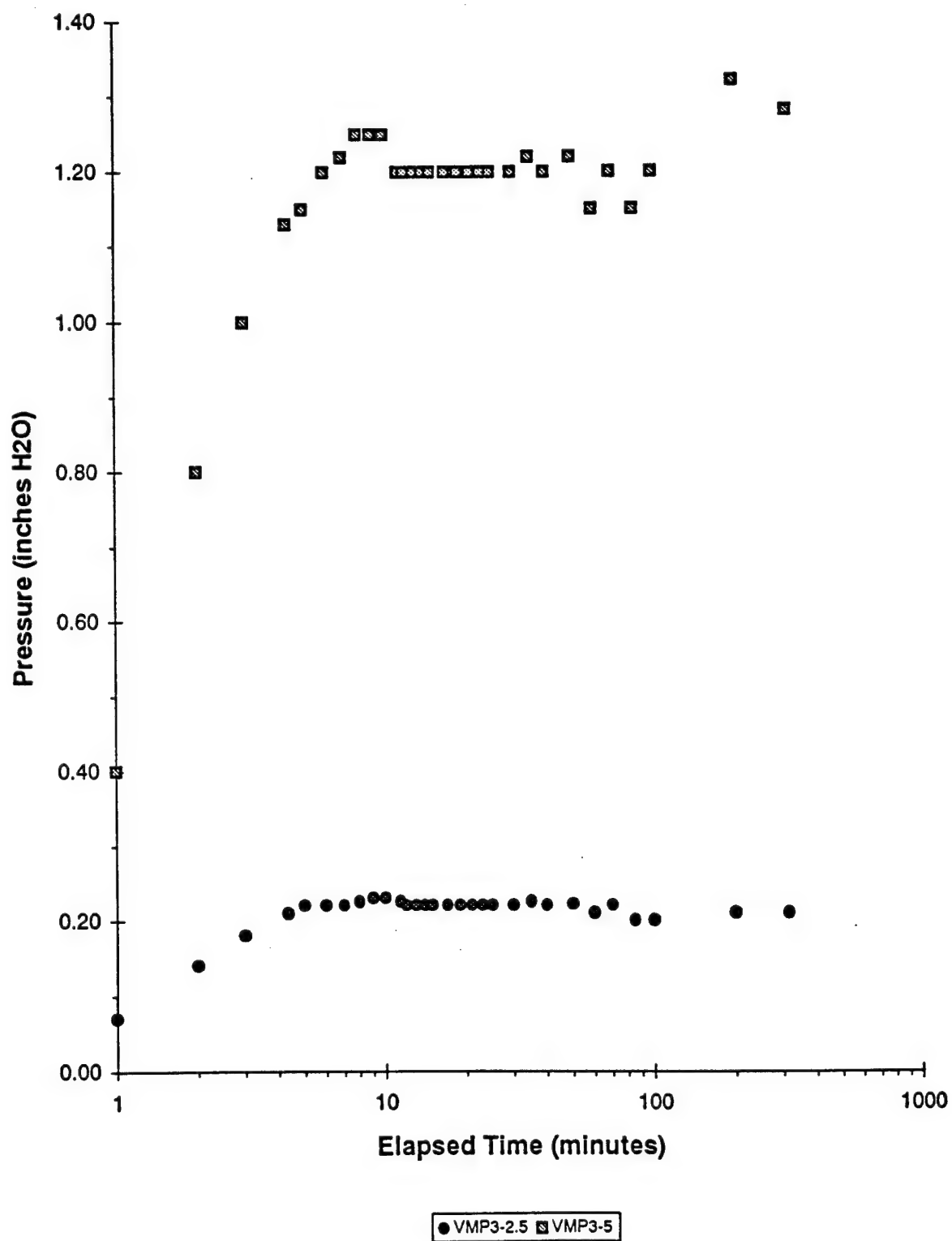




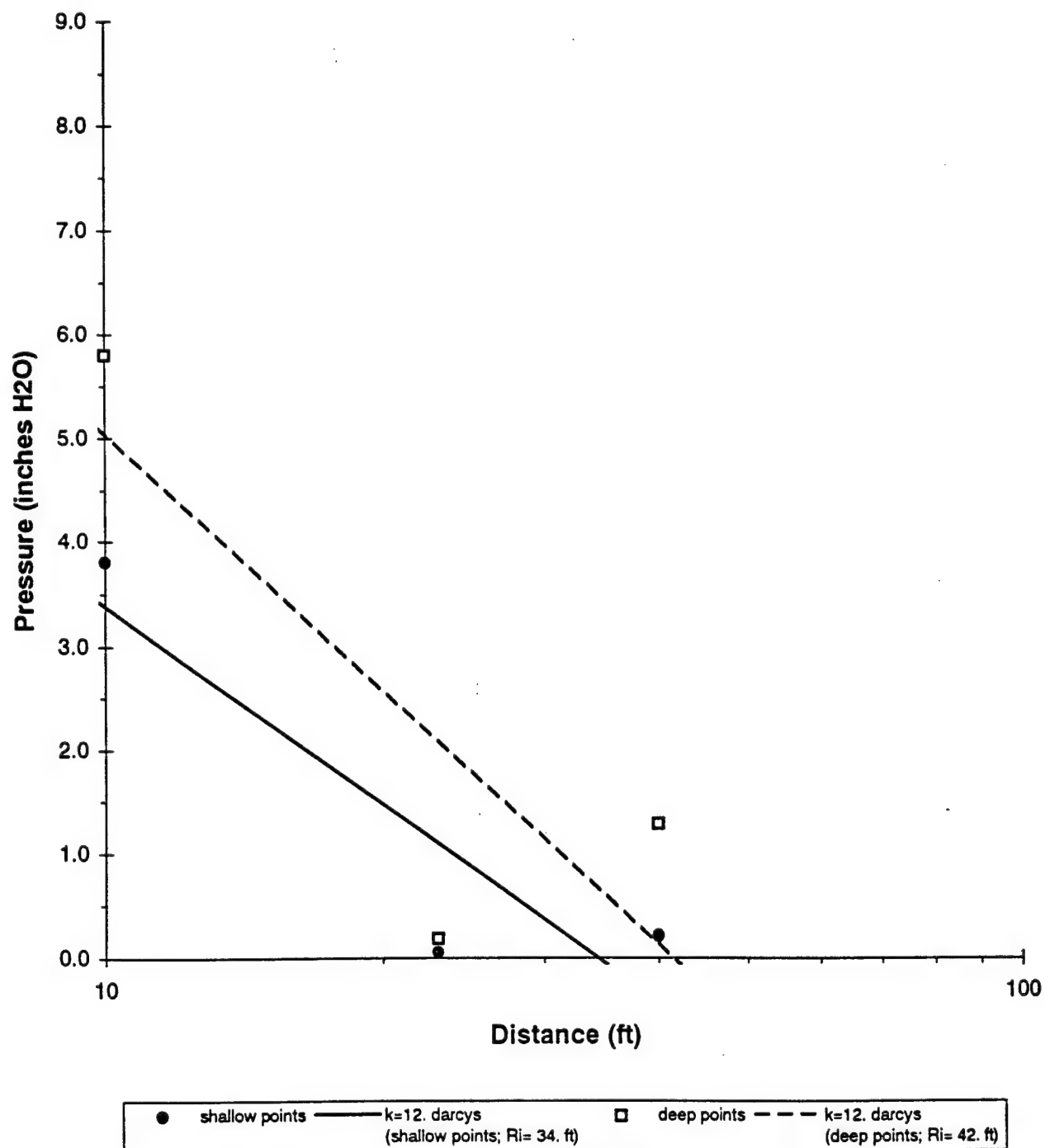
**Air Permeability Test**  
VMP2-3 & VMP2-5.5; radius = 23 ft  
PS-1B - Fairchild AFB, Washington



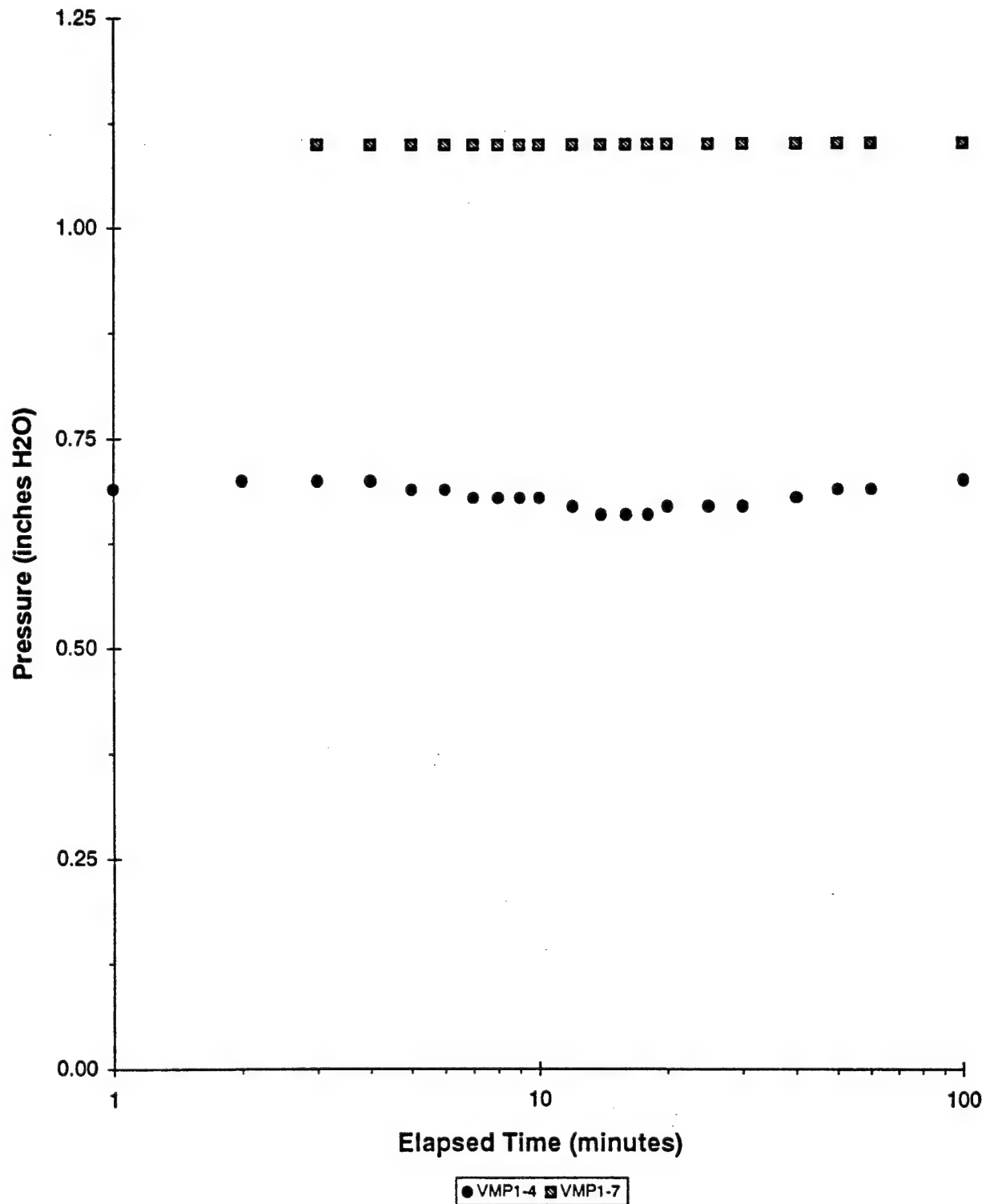
**Air Permeability Test**  
**VMP3-3 & VMP3-5; radius = 40 feet**  
**PS-1B - Fairchild AFB, Washington**



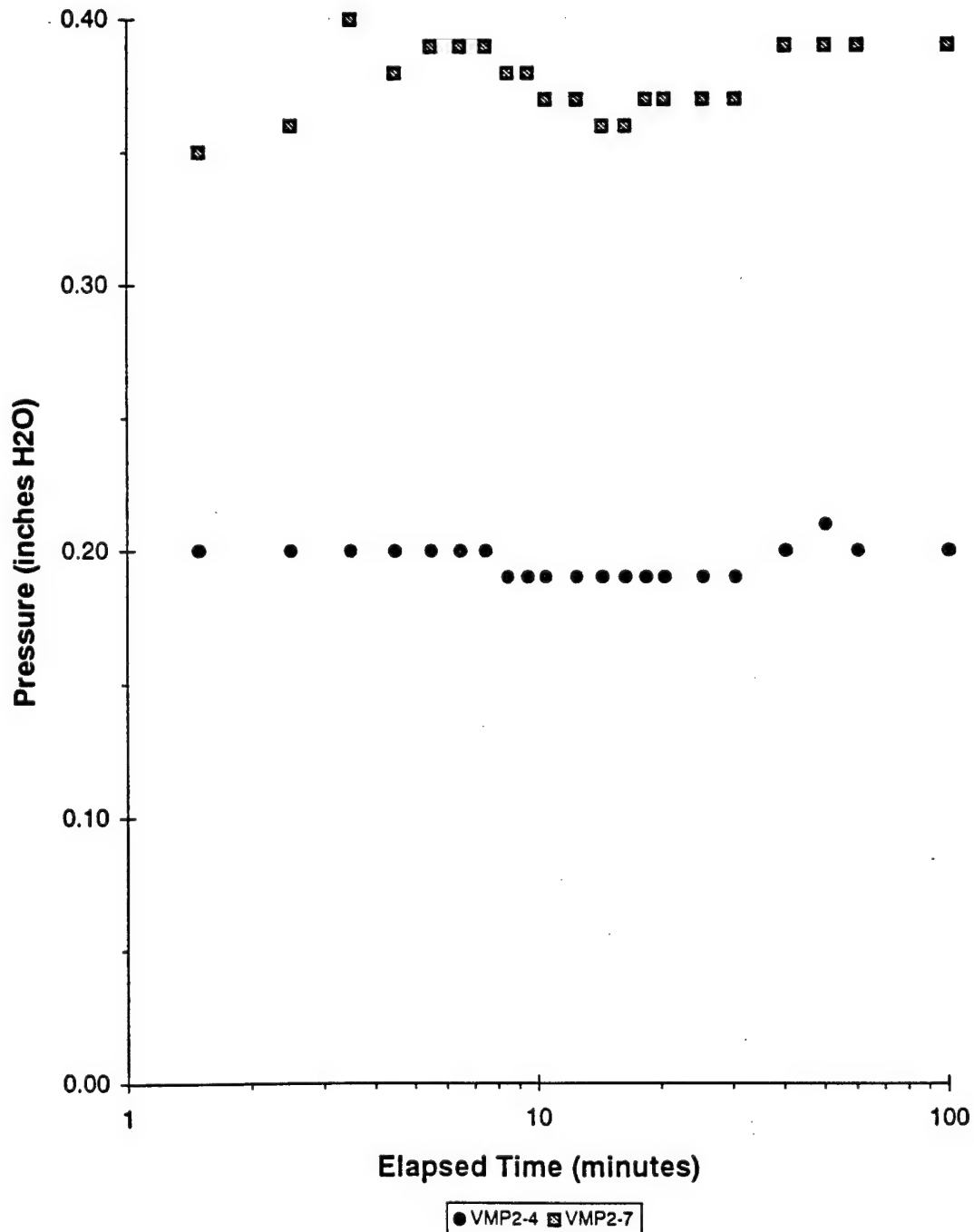
**Air Permeability Test**  
**Steady-state Calculation Method**  
**PS-1B - Fairchild AFB, Washington**



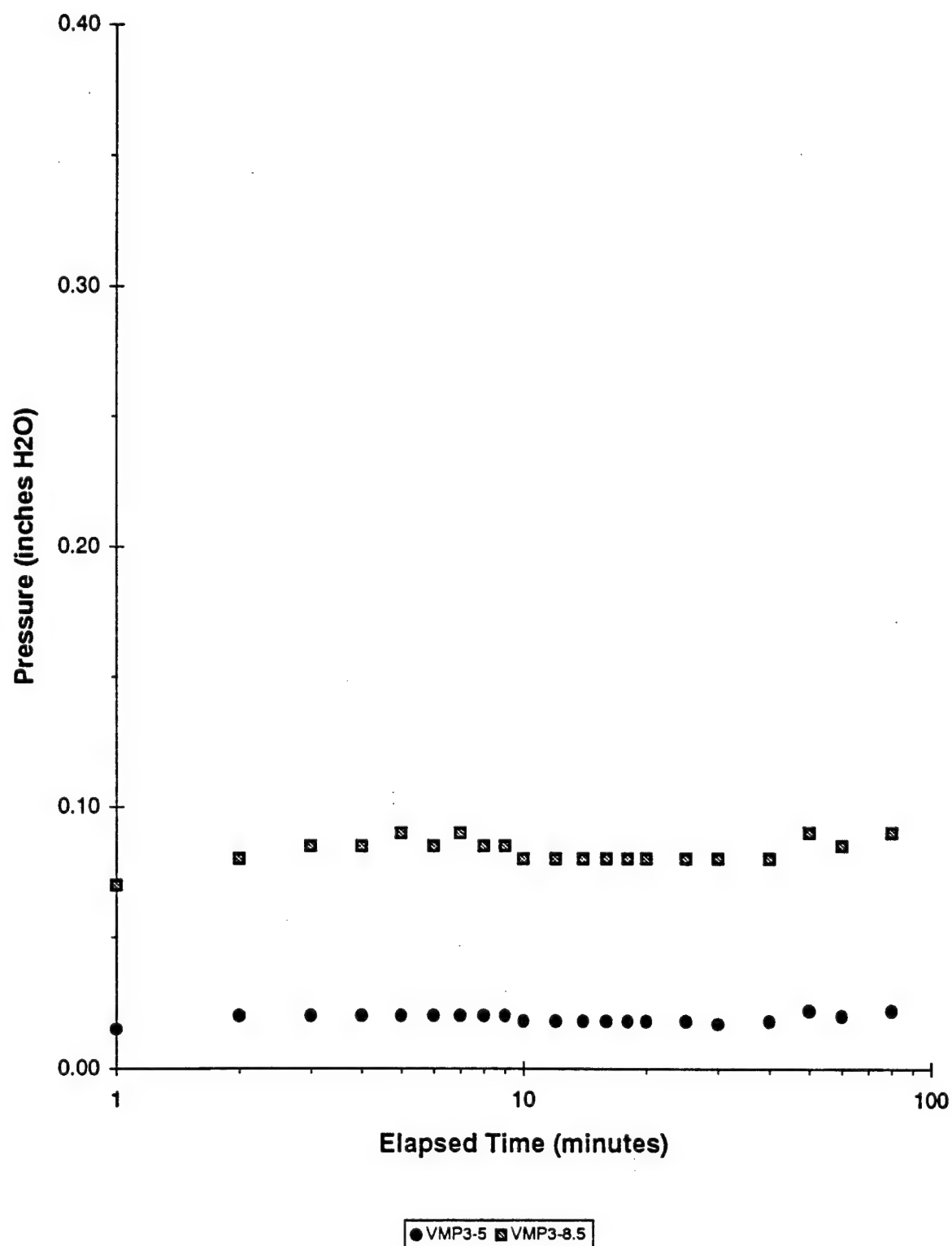
**Air Permeability Test**  
**VMP1-4 & VMP1-7; radius = 10 feet**  
**Bldg 2034 - Fairchild AFB, Washington**



**Air Permeability Test**  
**VMP2-4 & VMP2-7; radius = 20 ft**  
**Bldg 2034 - Fairchild AFB, Washington**

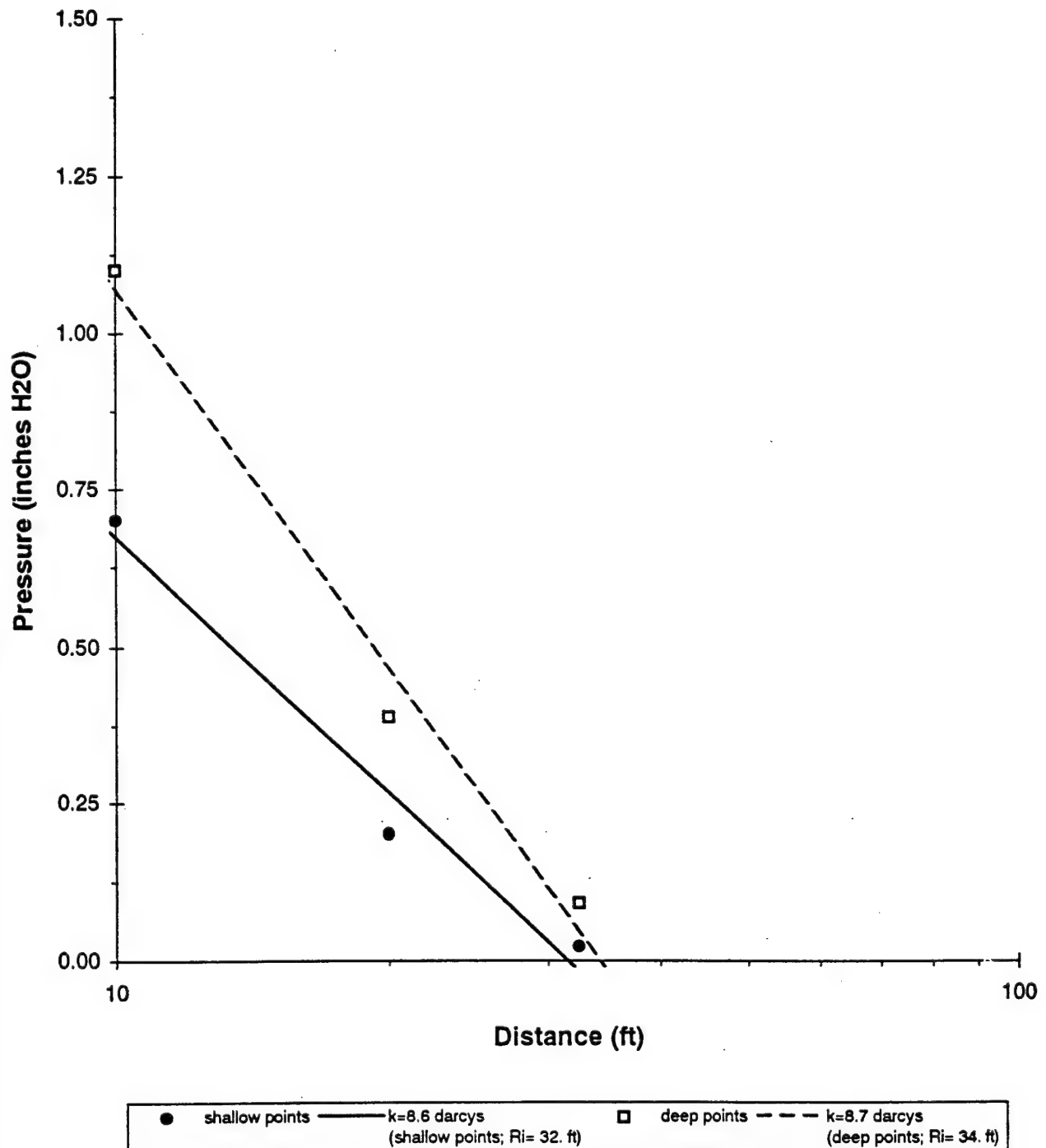


**Air Permeability Test**  
**VMP3-5 & VMP3-8.5; radius = 32.5 feet**  
**Bldg 2034 - Fairchild AFB, Washington**

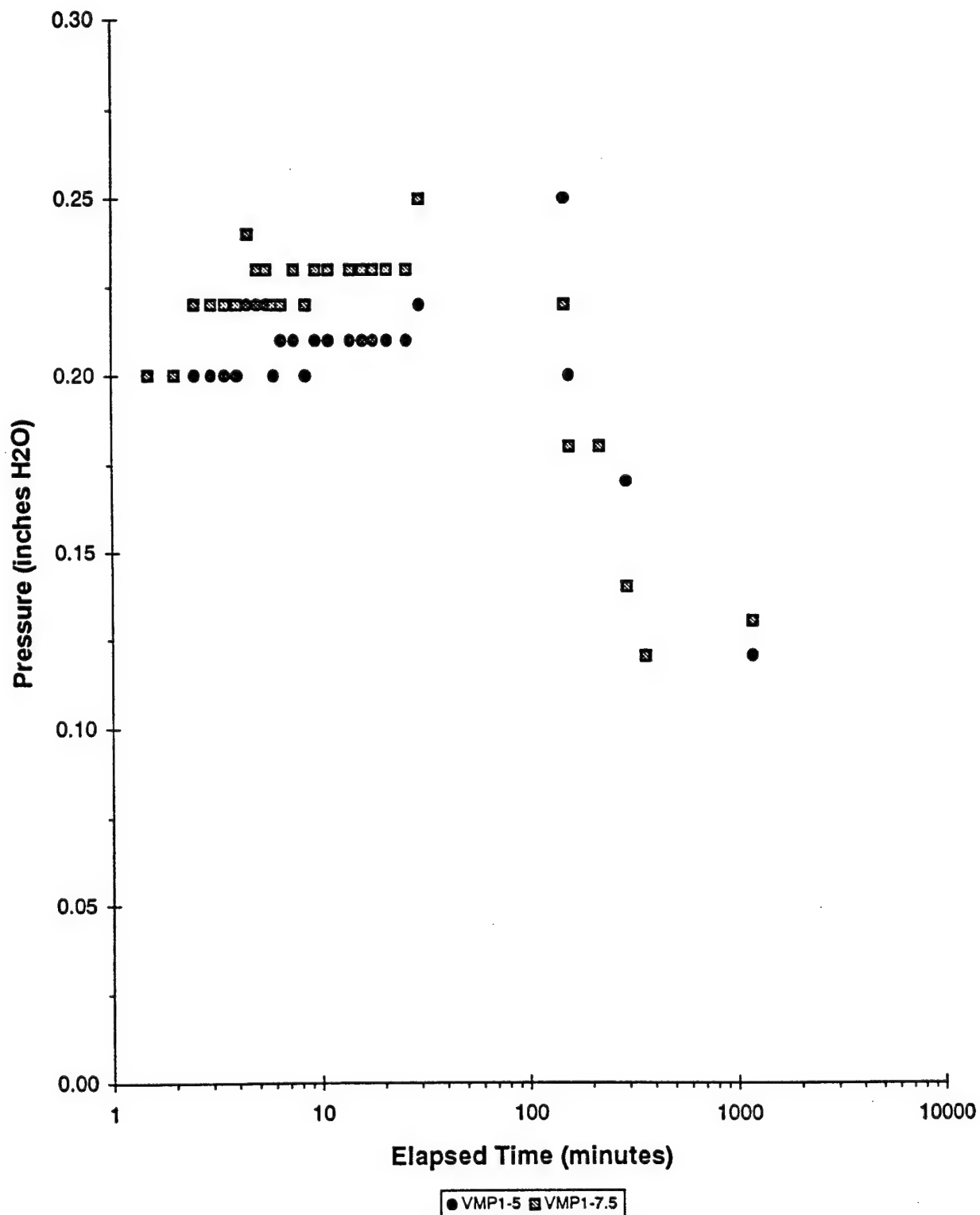




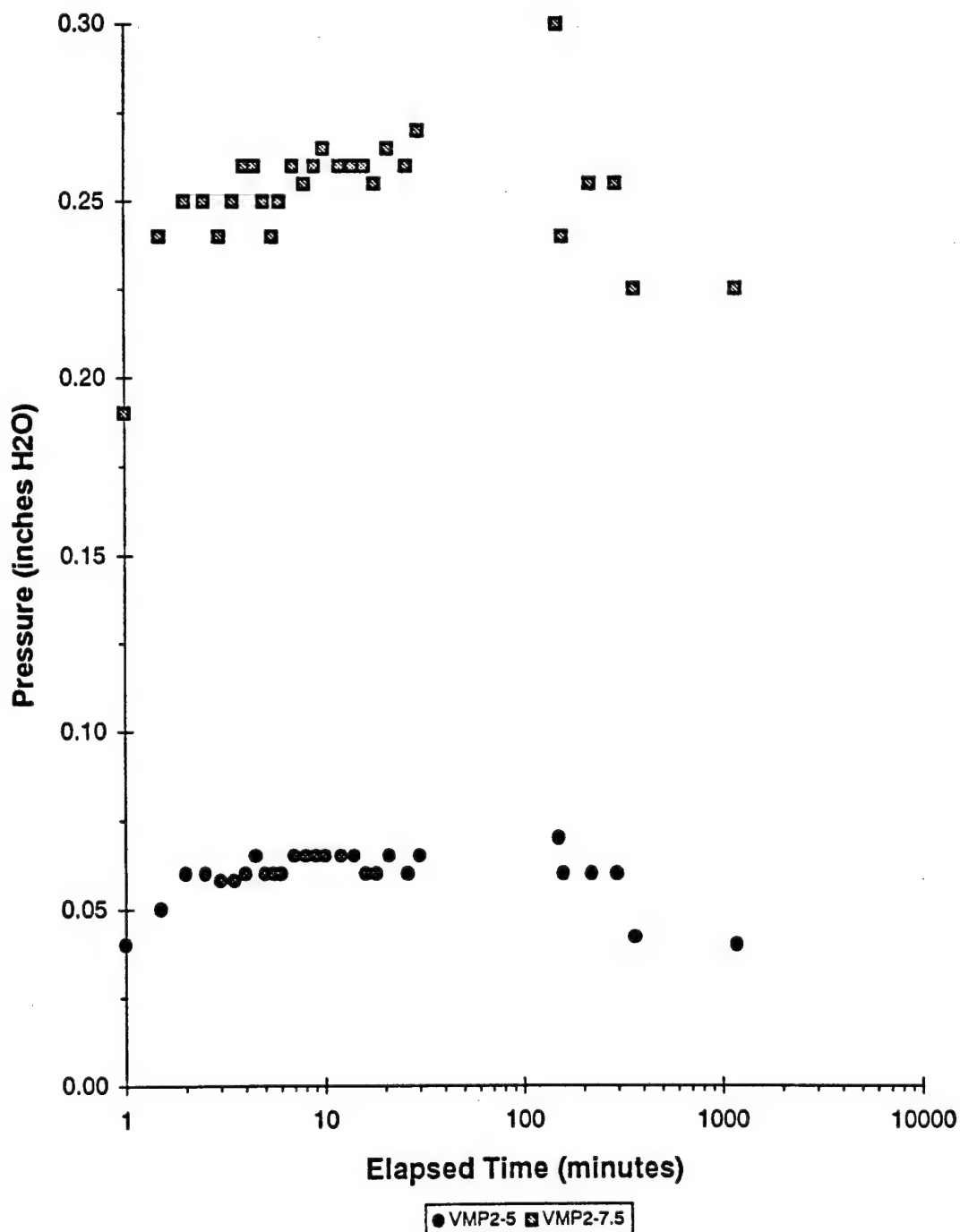
**Air Permeability Test**  
**Steady-state Calculation Method**  
**Bldg 2034 - Fairchild AFB, Washington**



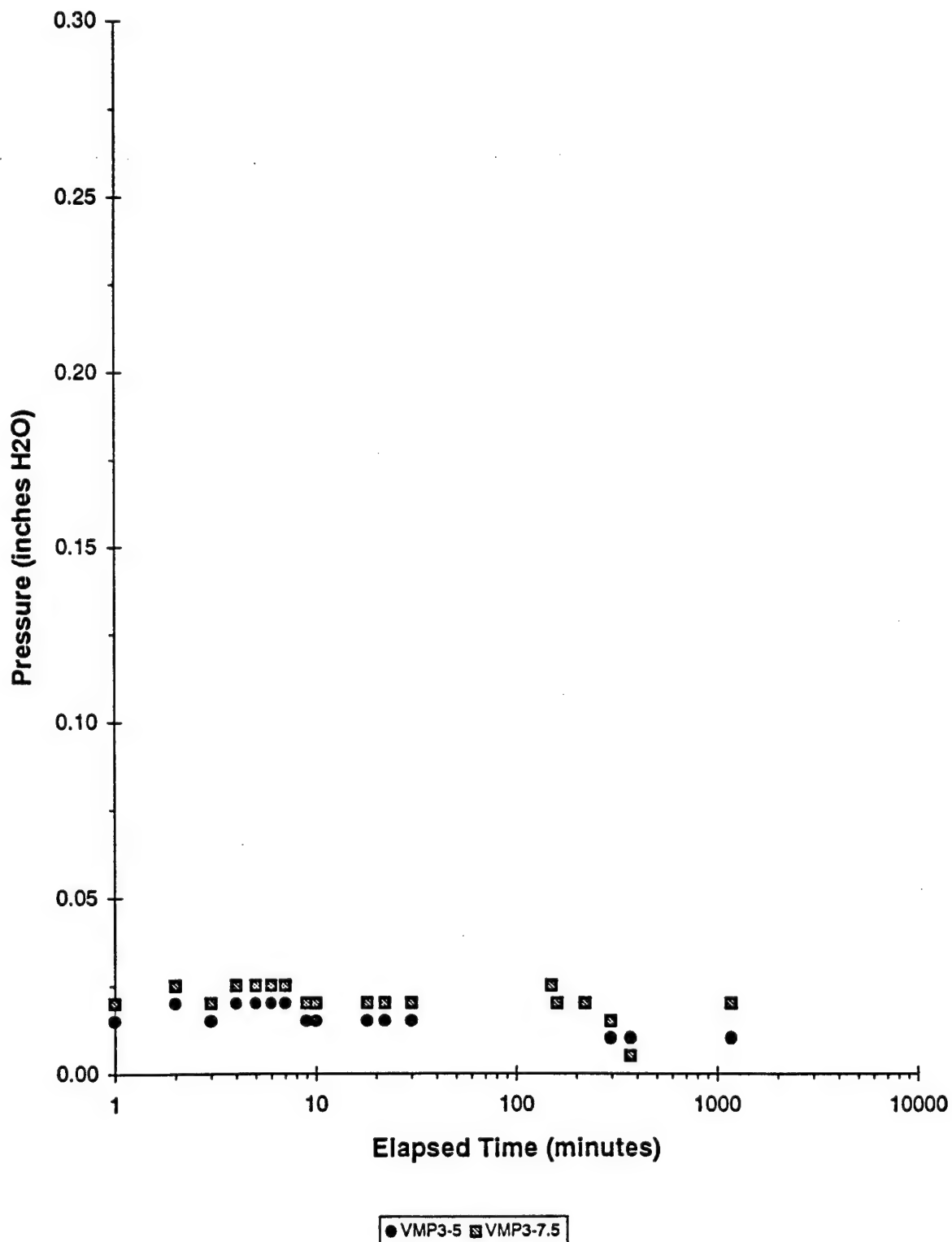
**Air Permeability Test**  
**VMP1-5 & VMP1-7.5; radius = 10 feet**  
**Bldg 2035 - Fairchild AFB, Washington**



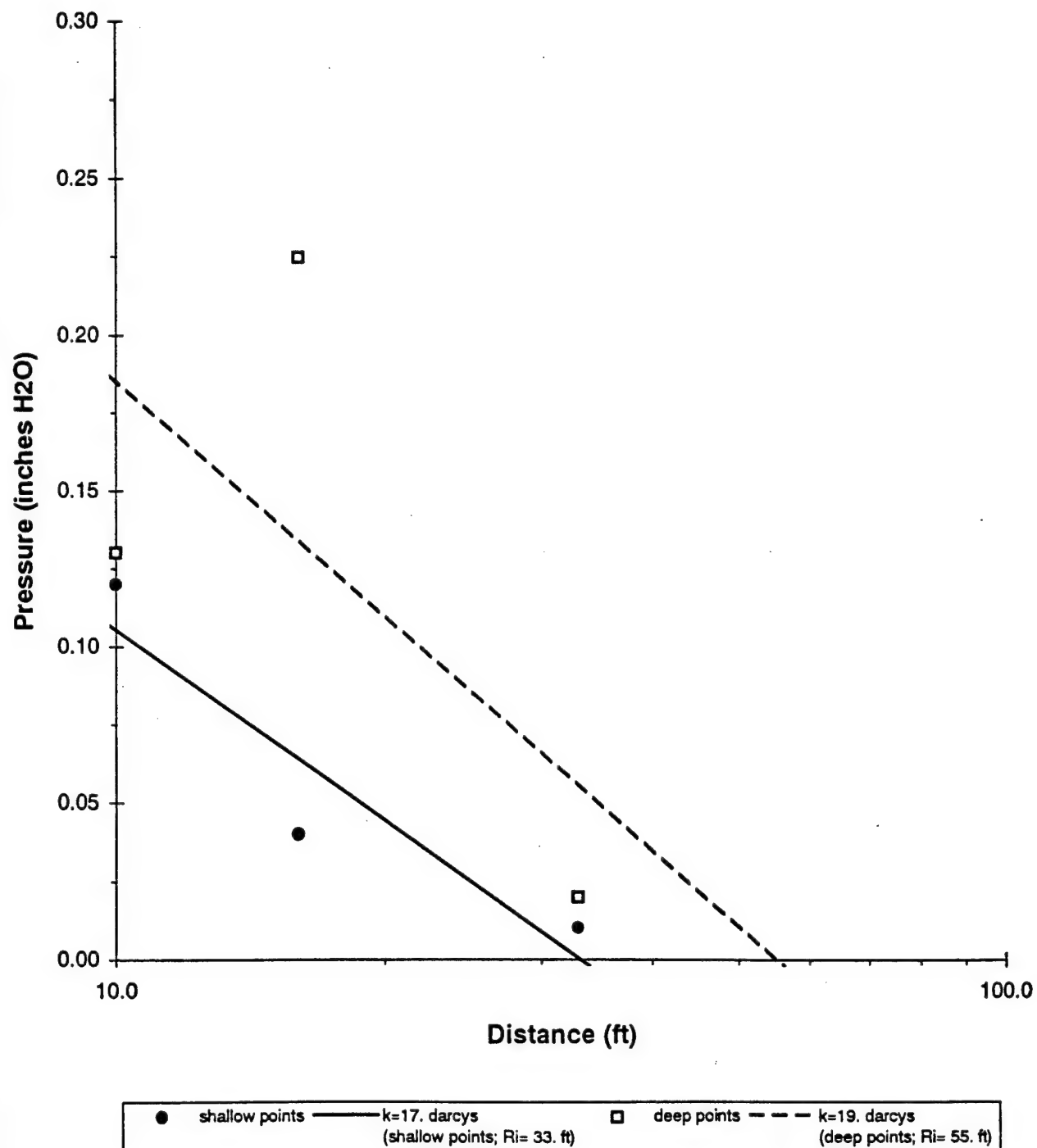
**Air Permeability Test**  
**VMP2-5 & VMP2-7.5; radius = 16 ft**  
**Bldg 2035 - Fairchild AFB, Washington**



**Air Permeability Test**  
**VMP3-5 & VMP3-7.5; radius = 33 feet**  
**Bldg 2035 - Fairchild AFB, Washington**



**Air Permeability Test  
Steady-state Calculation Method  
Bldg 2035 - Fairchild AFB, Washington**



**APPENDIX E**  
***IN SITU* RESPIRATION TEST RESULTS**



Respiration Test at VMP1-4  
PS-2 - Fairchild AFB, WA

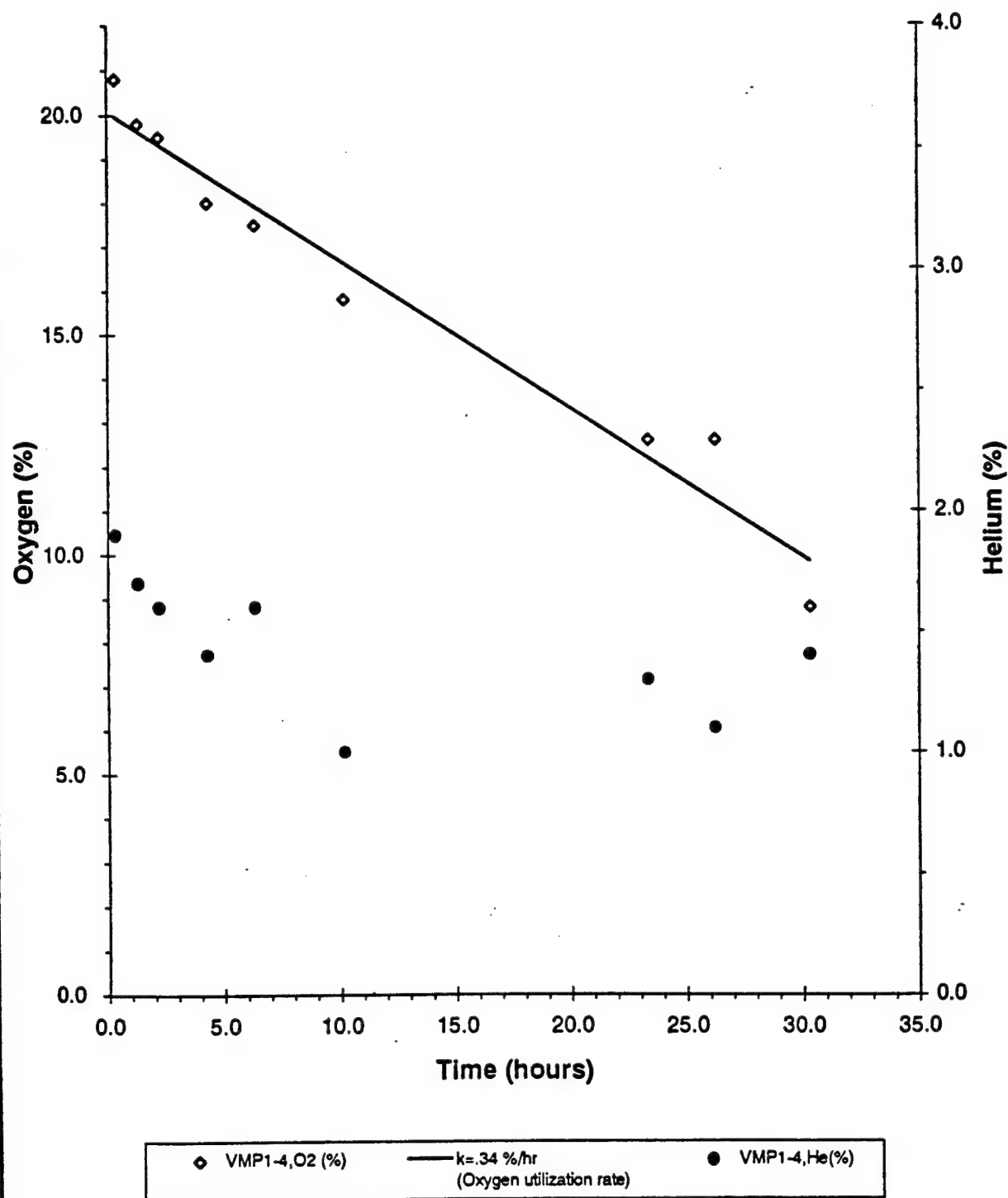


FIGURE E.2

Respiration Test at VMP1-7.5  
PS-2 - Fairchild AFB, WA

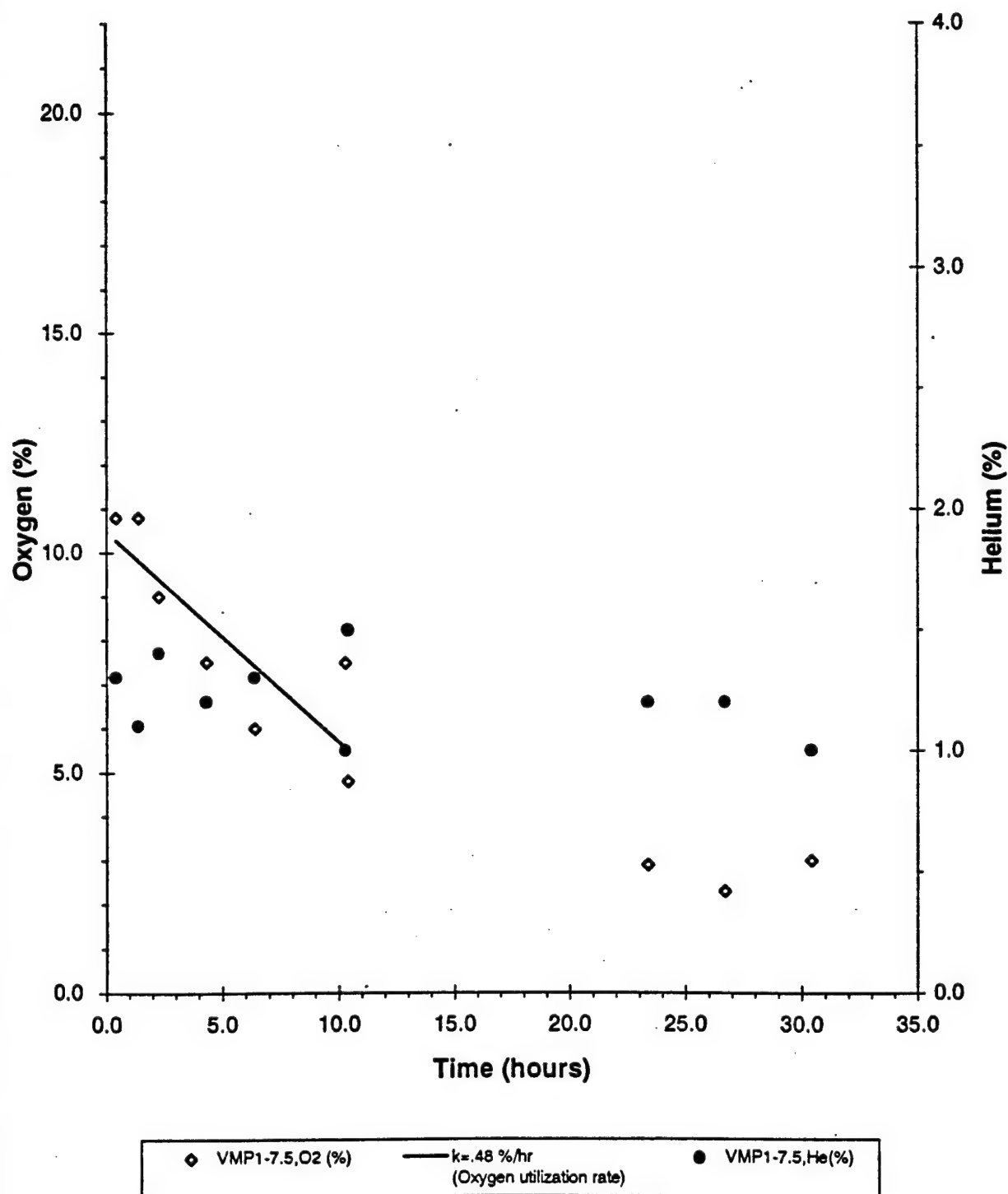
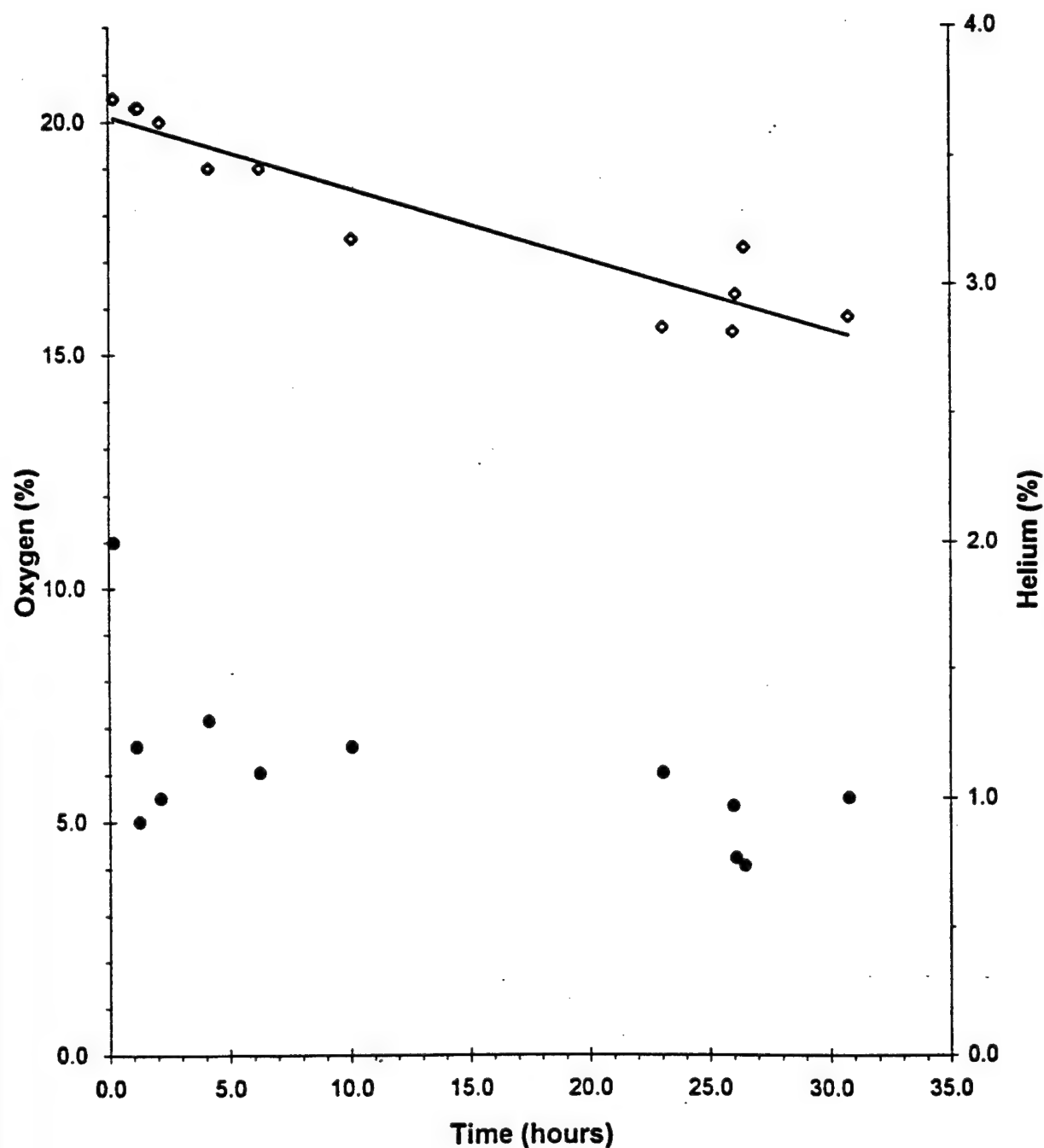


FIGURE E.3

# Respiration Test at VMP2-4 PS-2 - Fairchild AFB, WA



◆ VMP2-4,O<sub>2</sub> (%)      —  $k = .15\%/\text{hr}$  (Oxygen utilization rate)      ● VMP2-4,He(%)

FIGURE E.4

Respiration Test at VMP2-6.5  
PS-2 - Fairchild AFB, WA

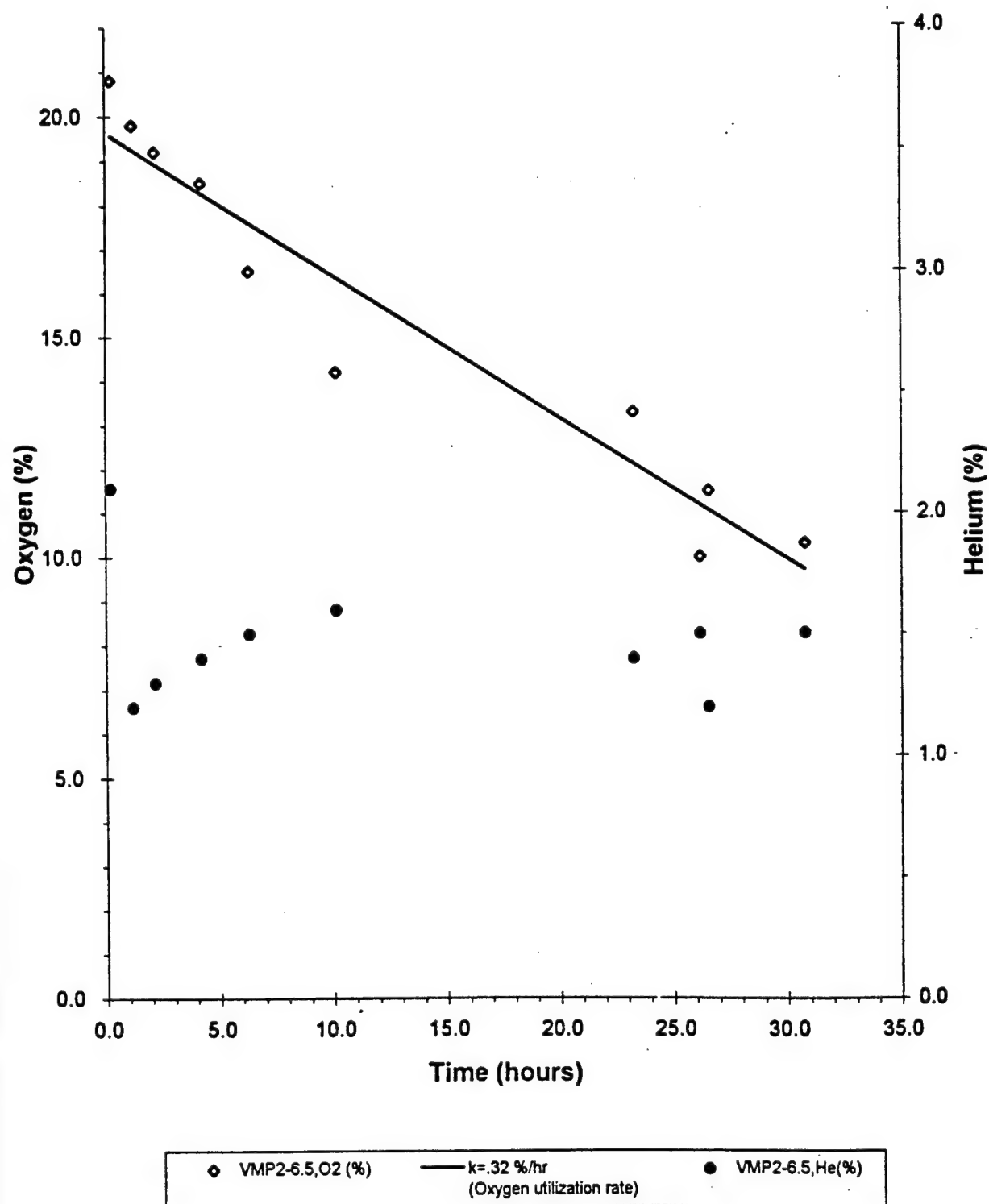


FIGURE E.5

Respiration Test at VMP3-4  
PS-2 - Fairchild AFB, WA

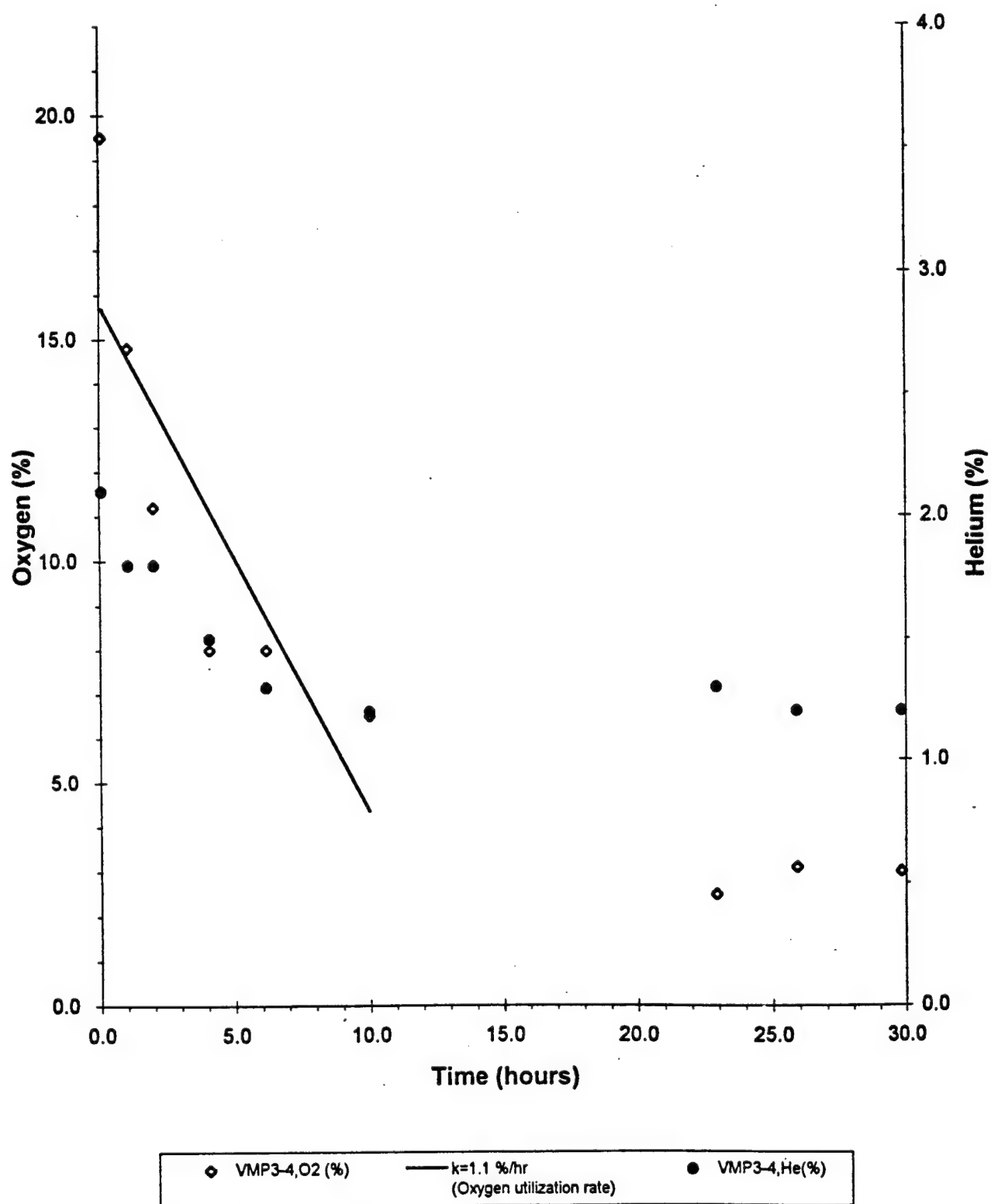


FIGURE E.6

Respiration Test at VMP3-7  
PS-2 - Fairchild AFB, WA

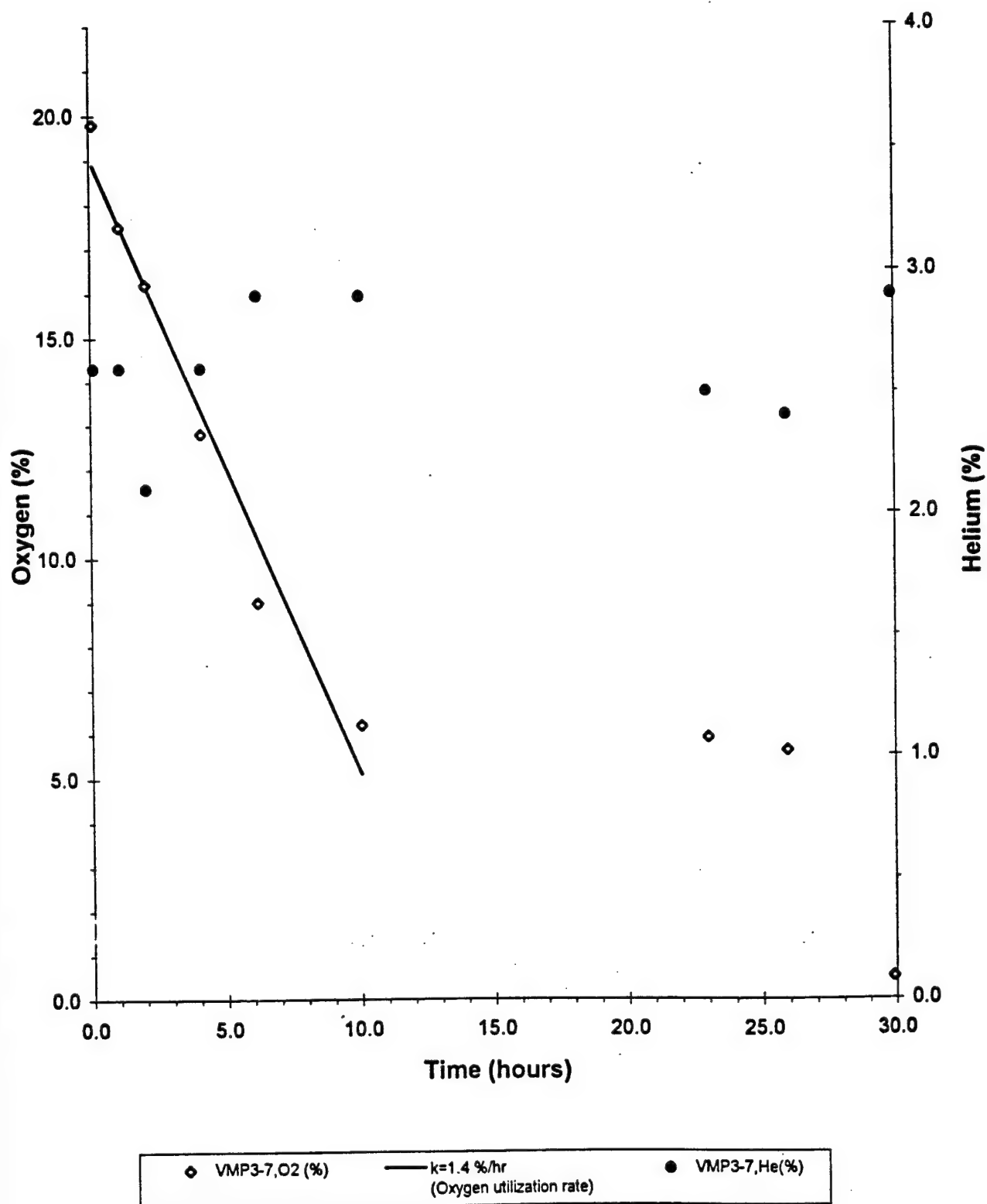


FIGURE E.7

Respiration Test at VW-1  
PS-1A - Fairchild AFB, WA

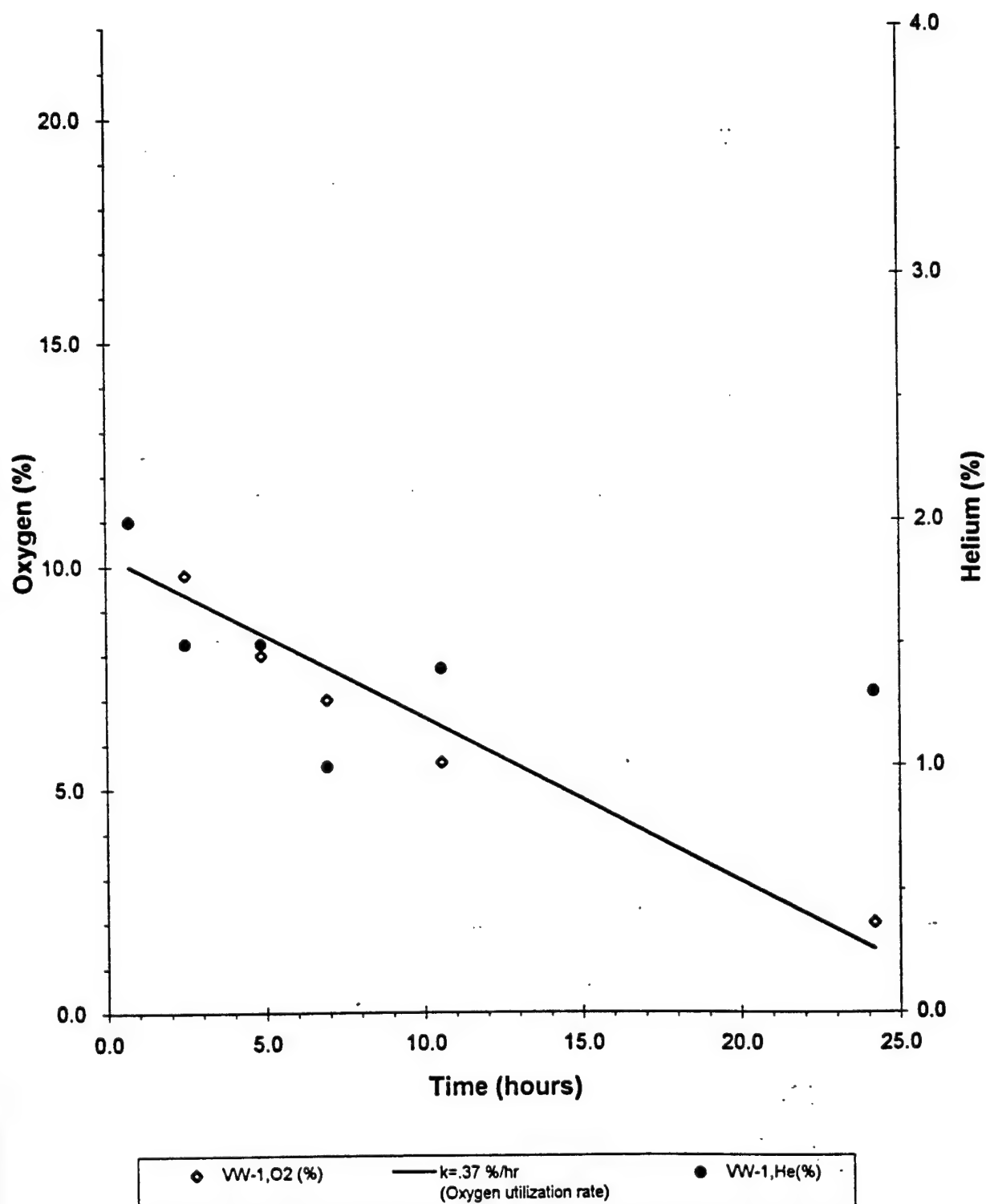
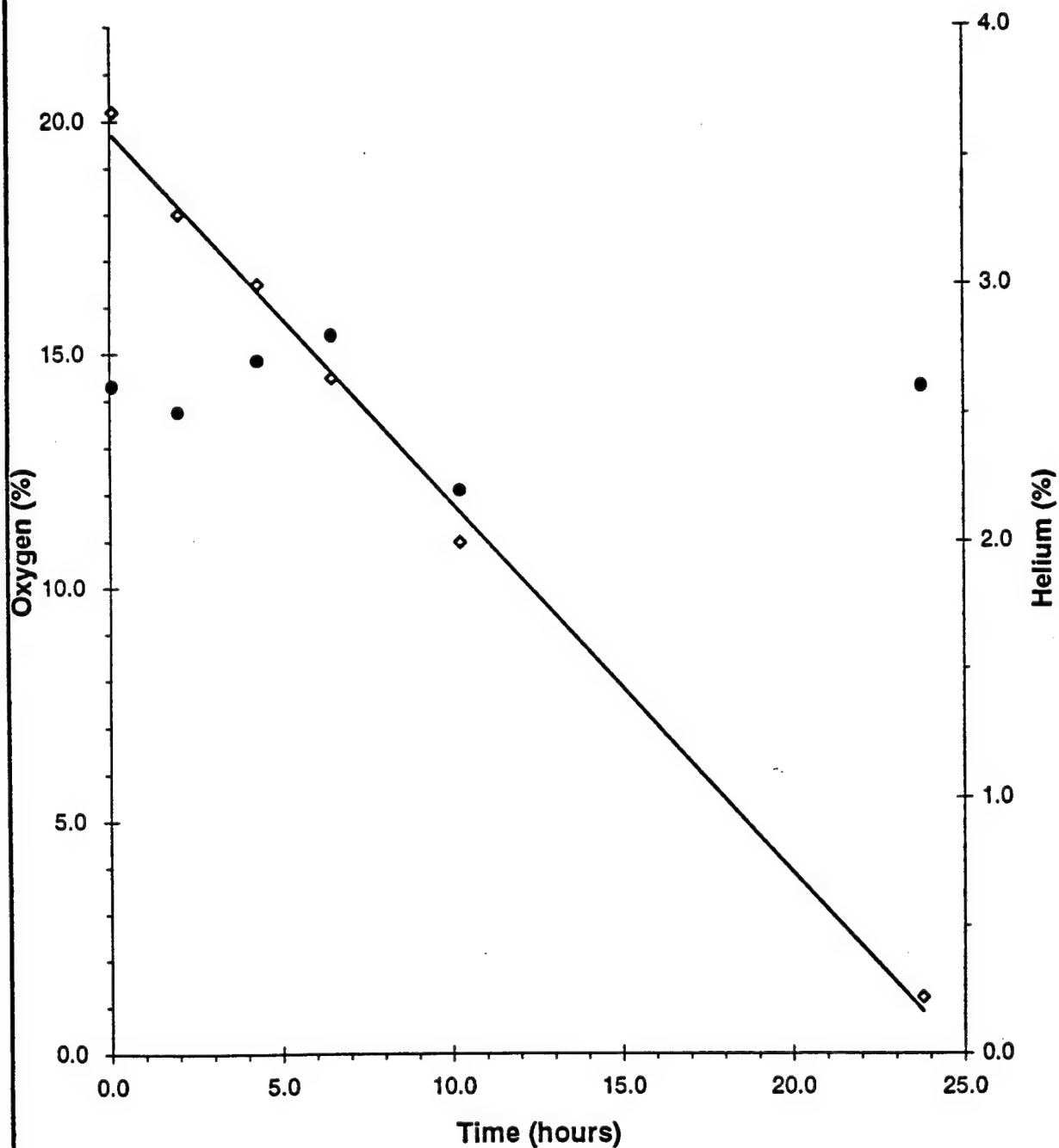




FIGURE E.8

Respiration Test at VMP1-4  
PS-1A - Fairchild AFB, WA



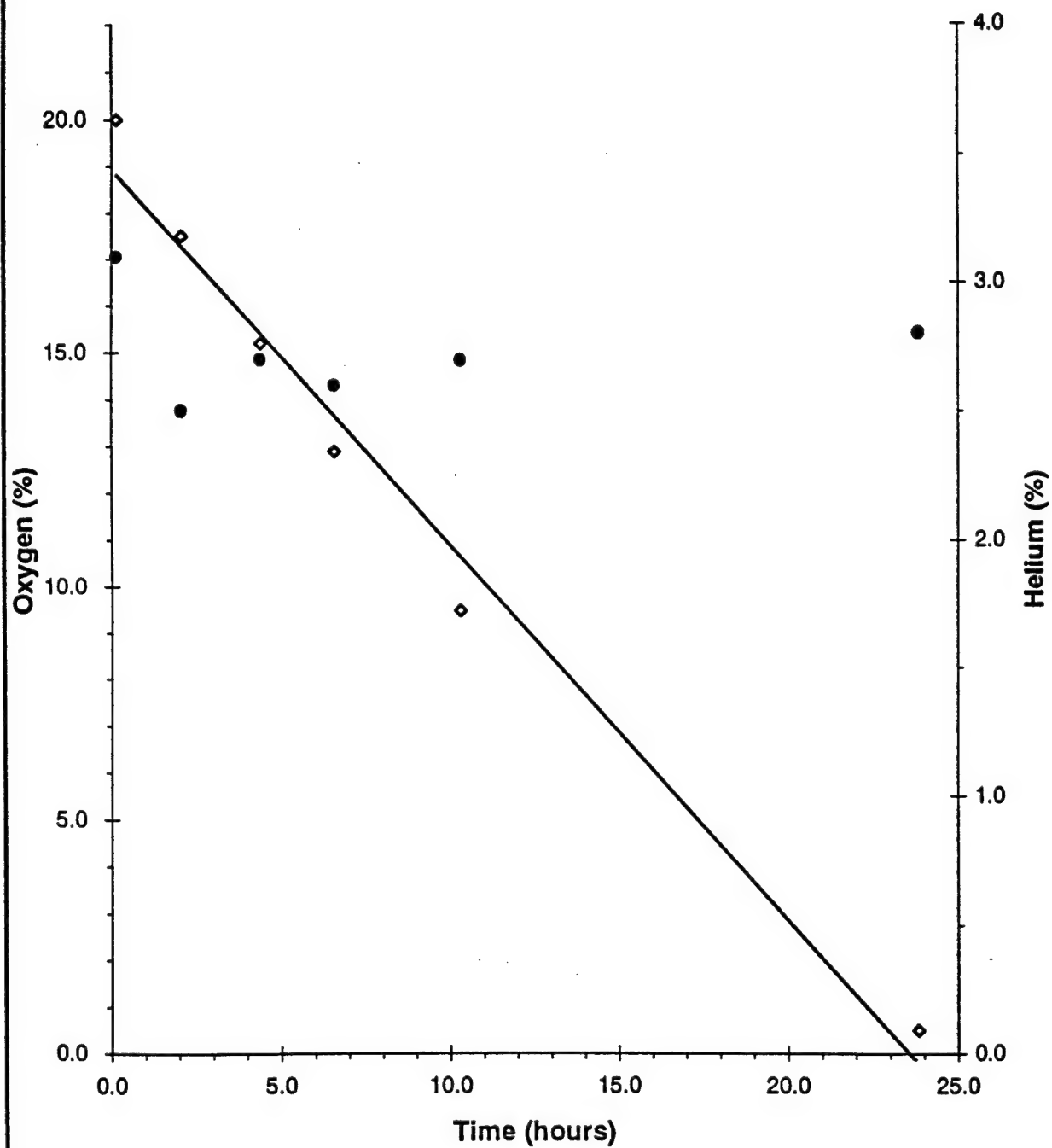
◇ VMP1-4, O<sub>2</sub> (%)

—  $k = .79 \text{ \% / hr}$   
(Oxygen utilization rate)

● VMP1-4, He (%)

FIGURE E.9

Respiration Test at VMP1-6  
PS-1A - Fairchild AFB, WA



Respiration Test at VMP2-3  
PS-1A - Fairchild AFB, WA

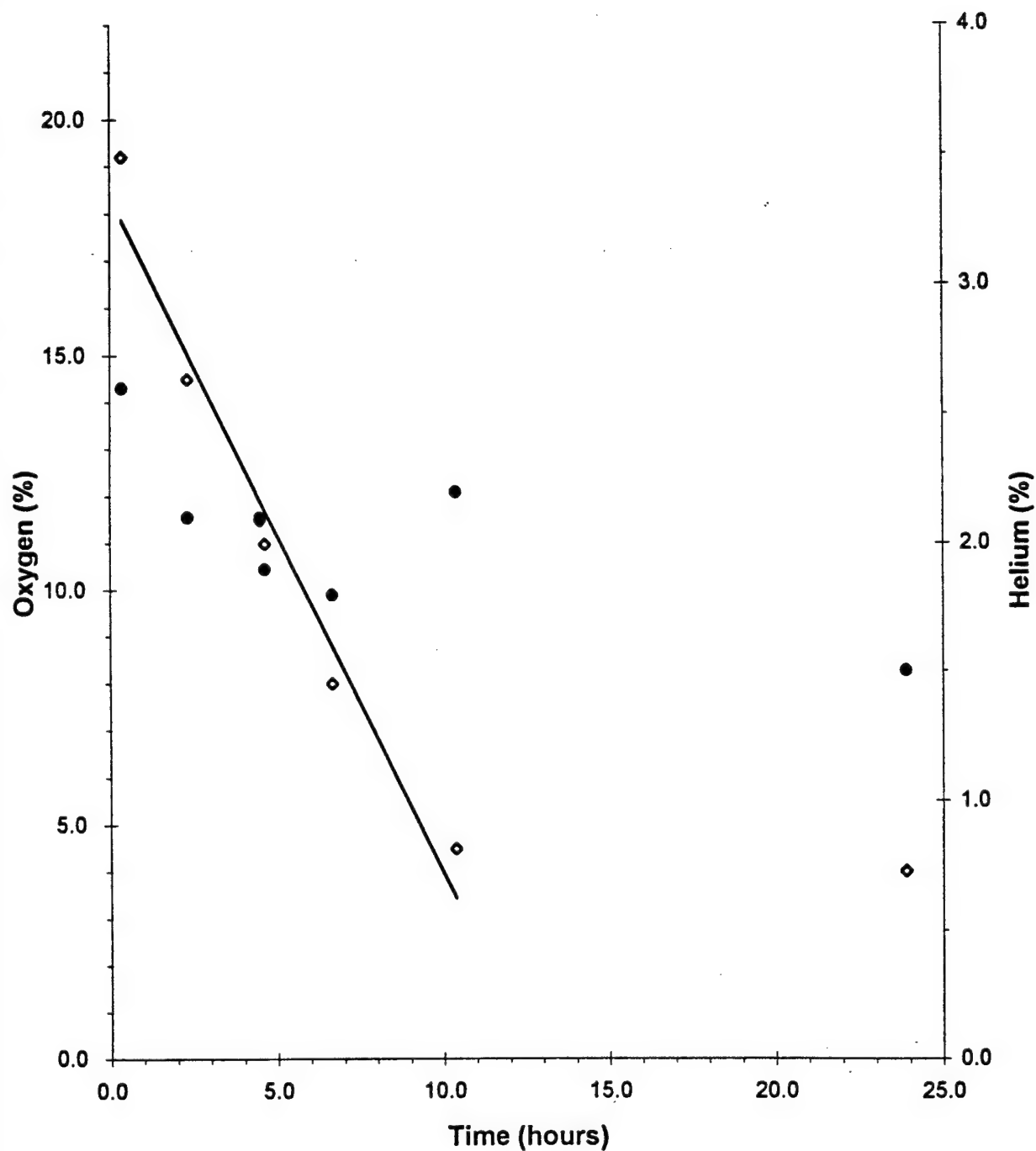


FIGURE E.11

Respiration Test at VMP2-5.5  
PS-1A - Fairchild AFB, WA

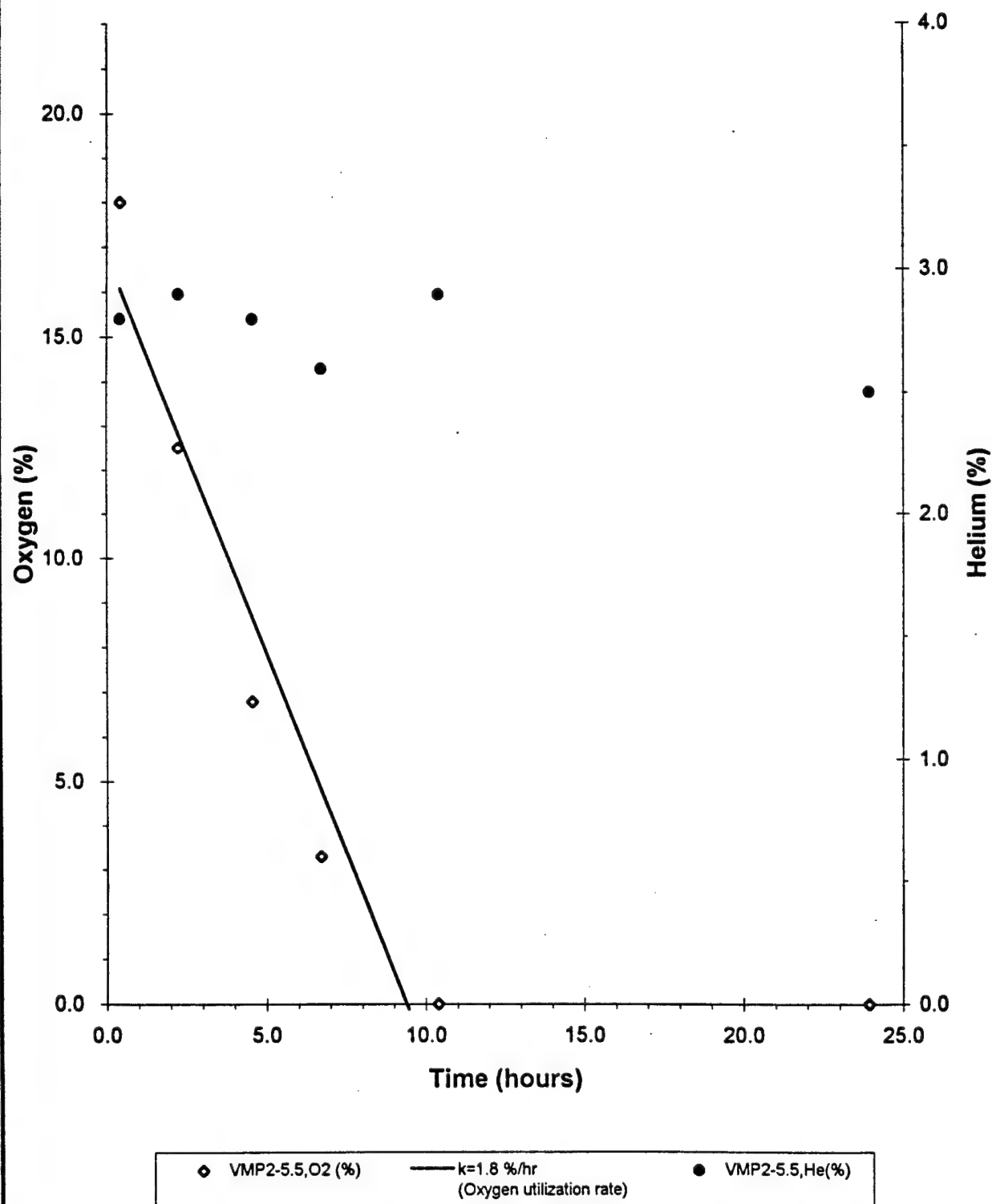


FIGURE E.12

Respiration Test at VMP3-5.5  
PS-1A - Fairchild AFB, WA

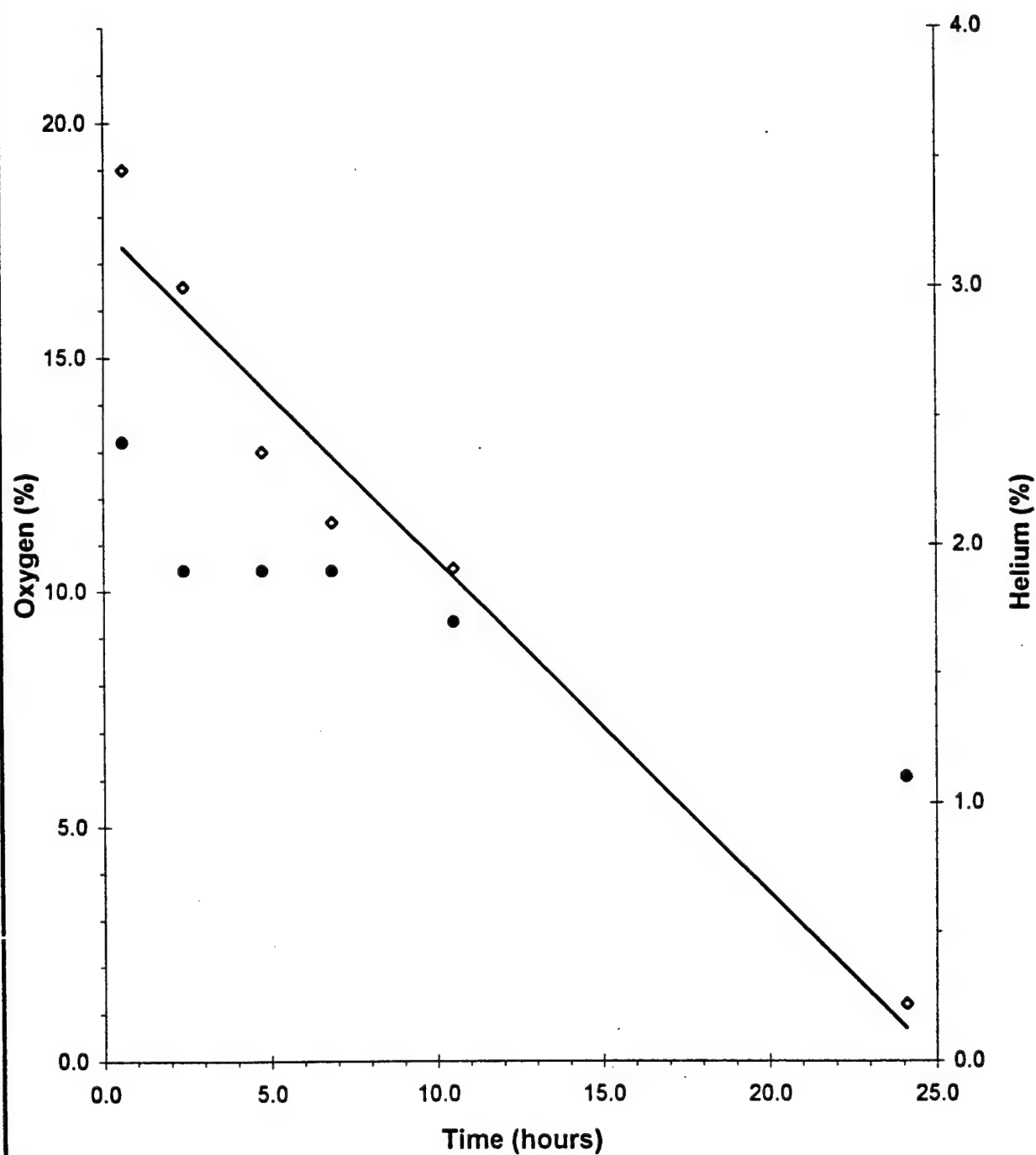
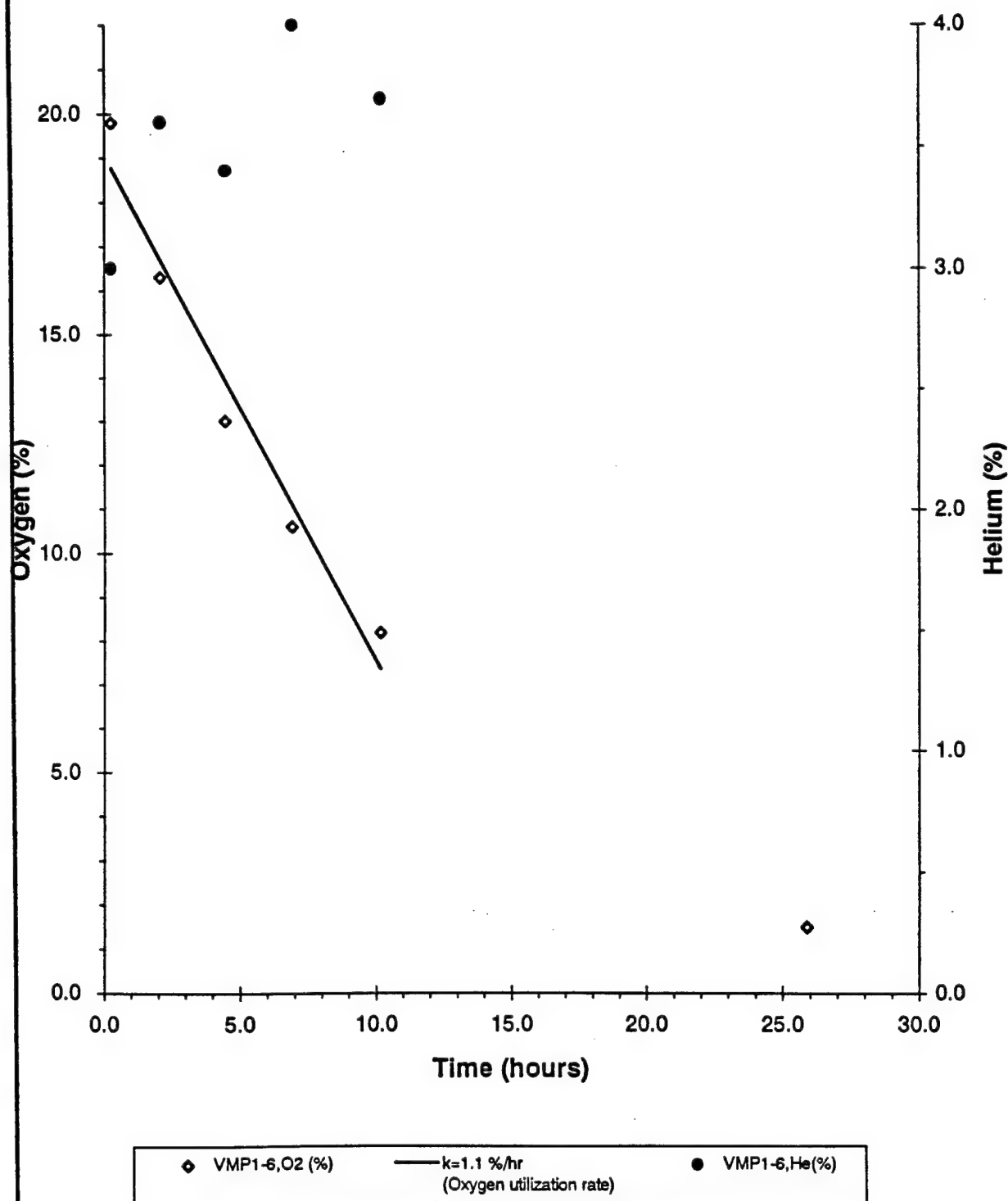
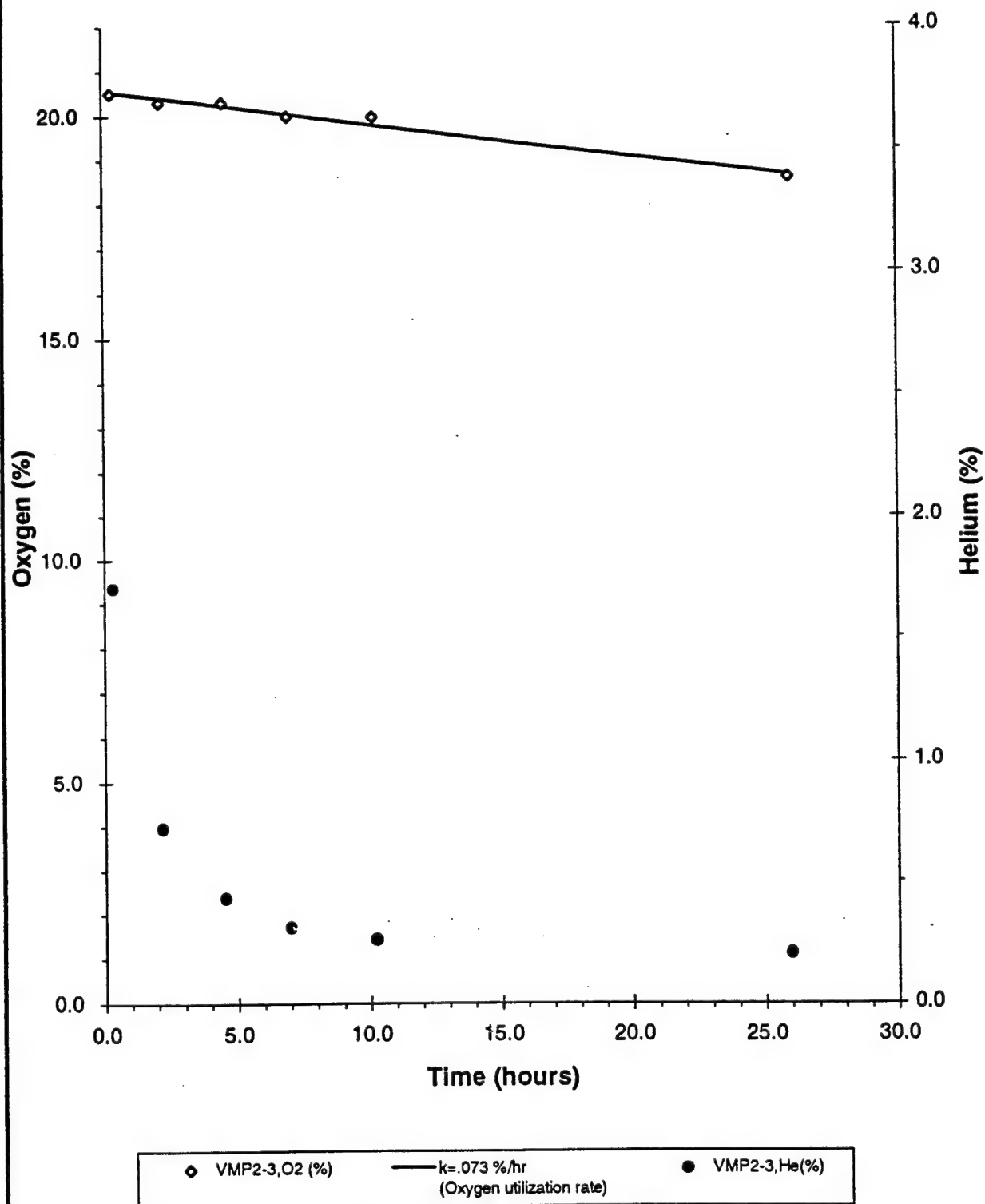


FIGURE E.13

Respiration Test at VMP1-6  
PS-1B - Fairchild AFB, WA



Respiration Test at VMP2-3  
PS-1B - Fairchild AFB, WA



Respiration Test at VMP2-5.5  
PS-1B - Fairchild AFB, WA

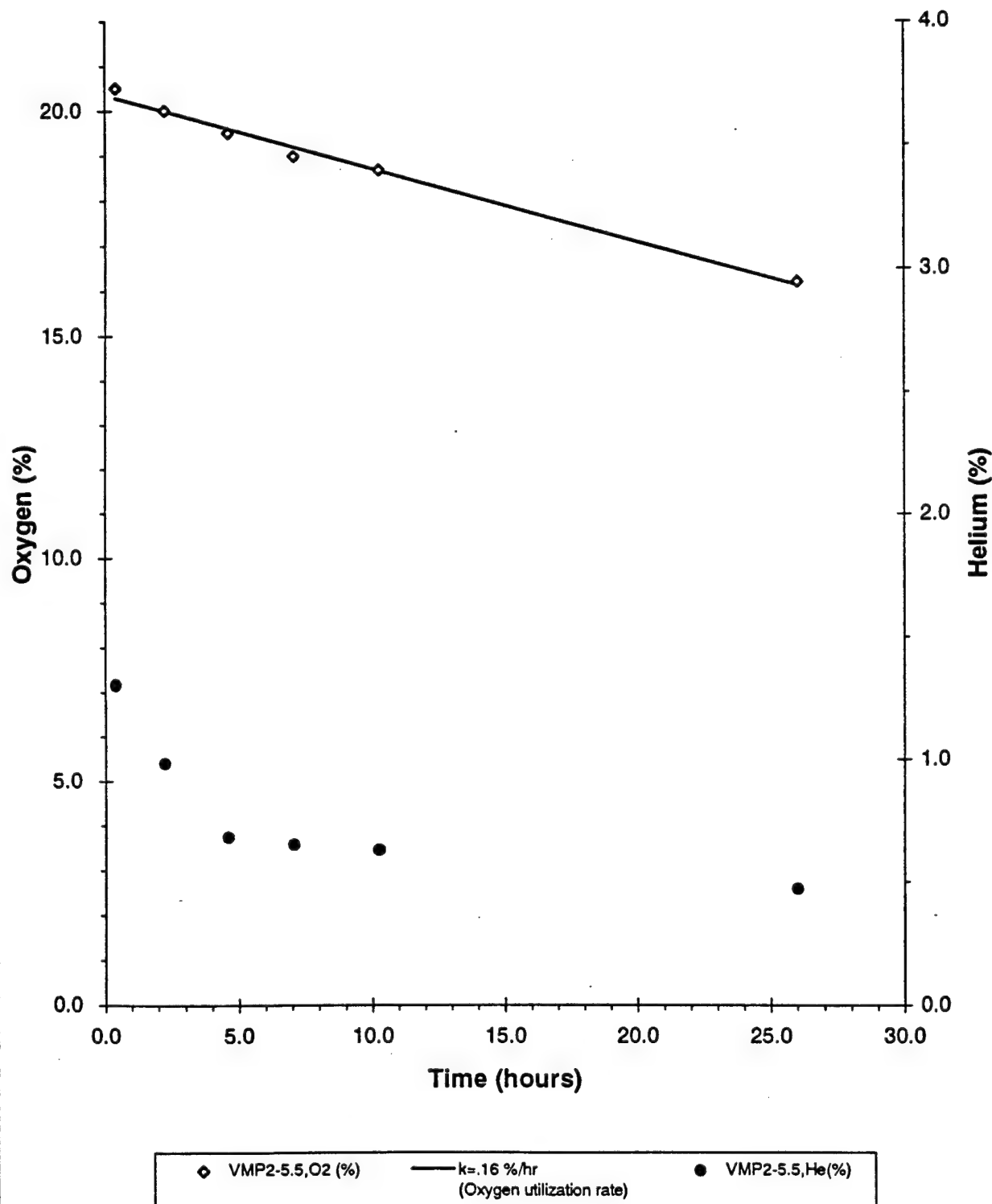
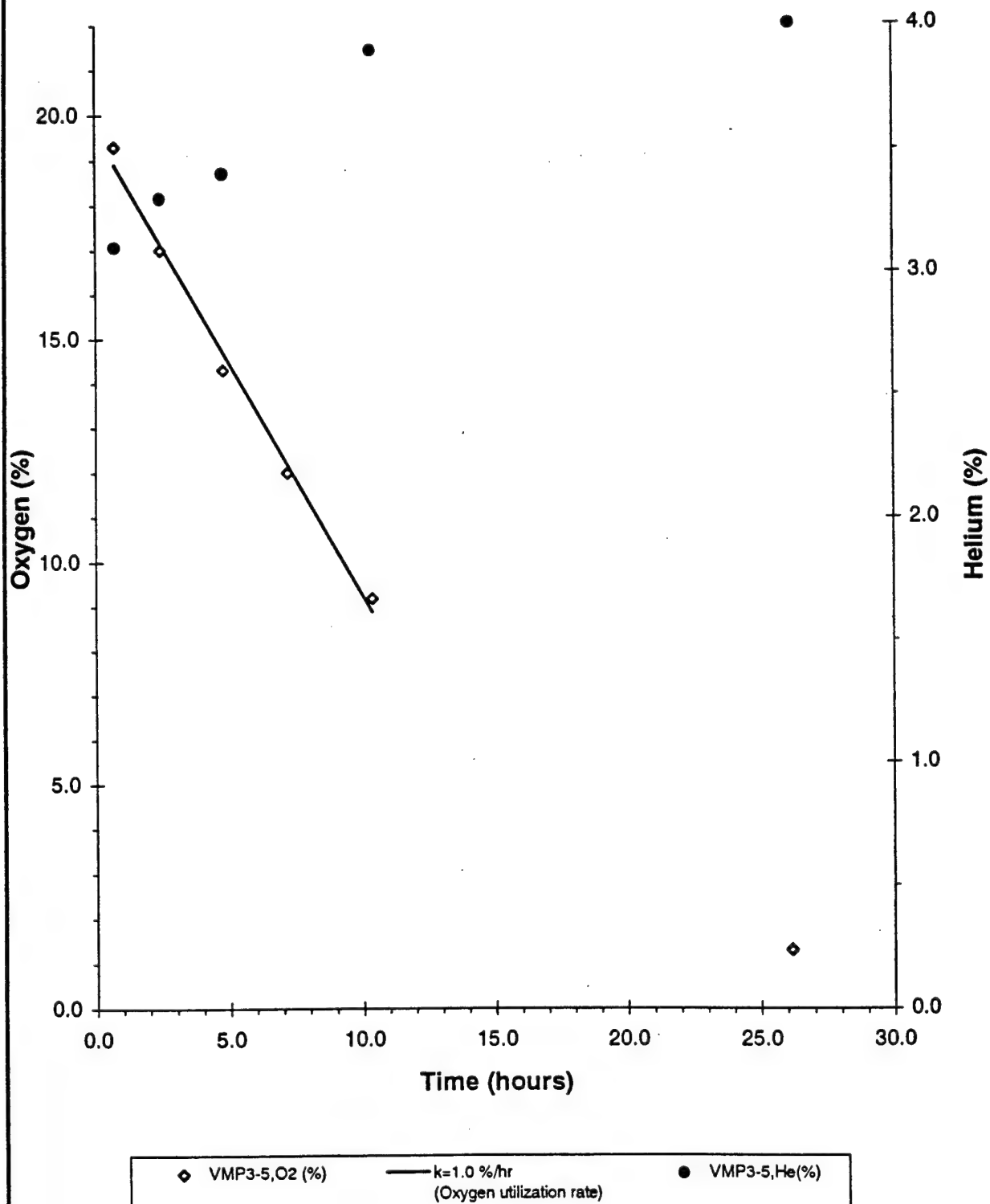


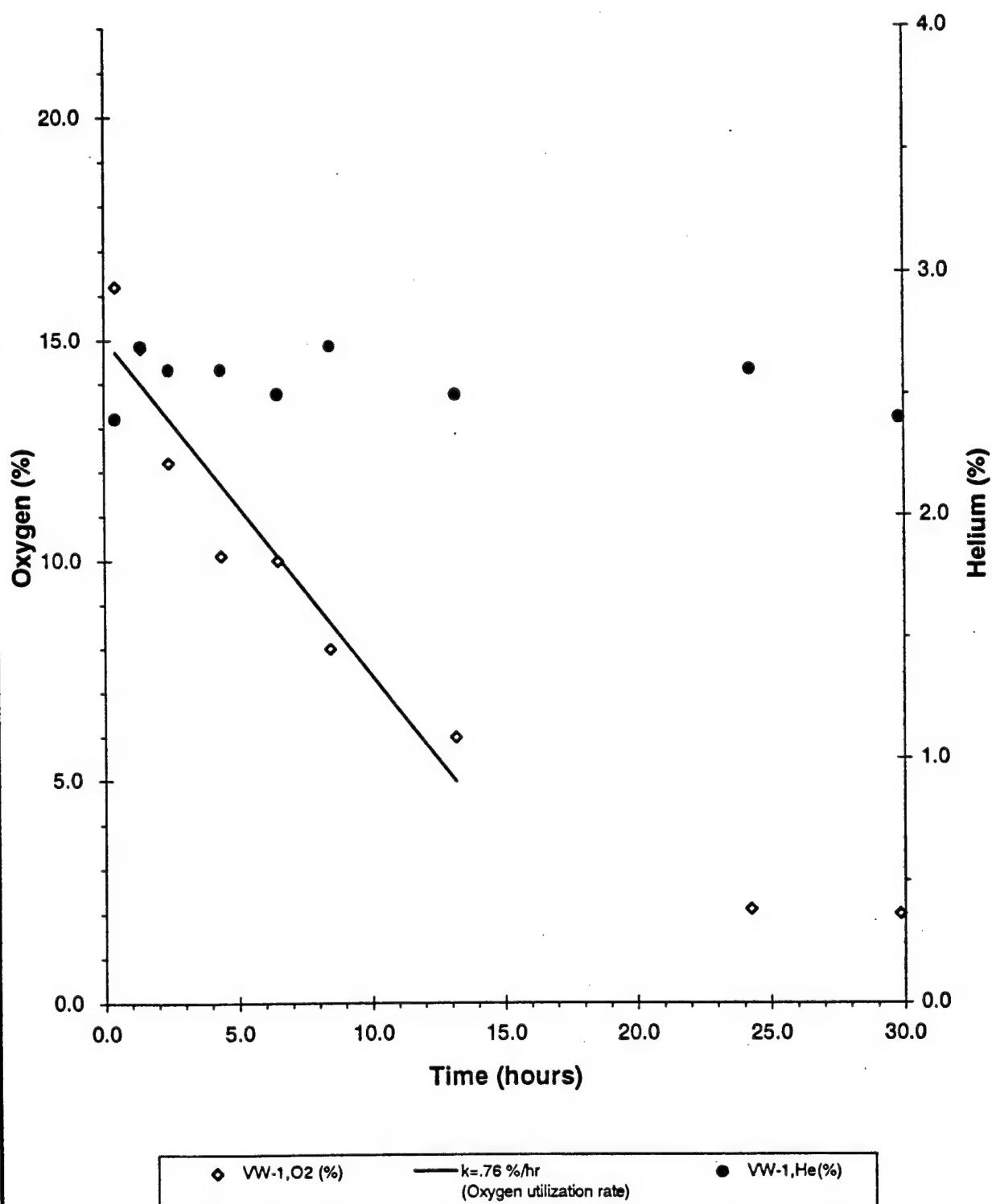


FIGURE E.16

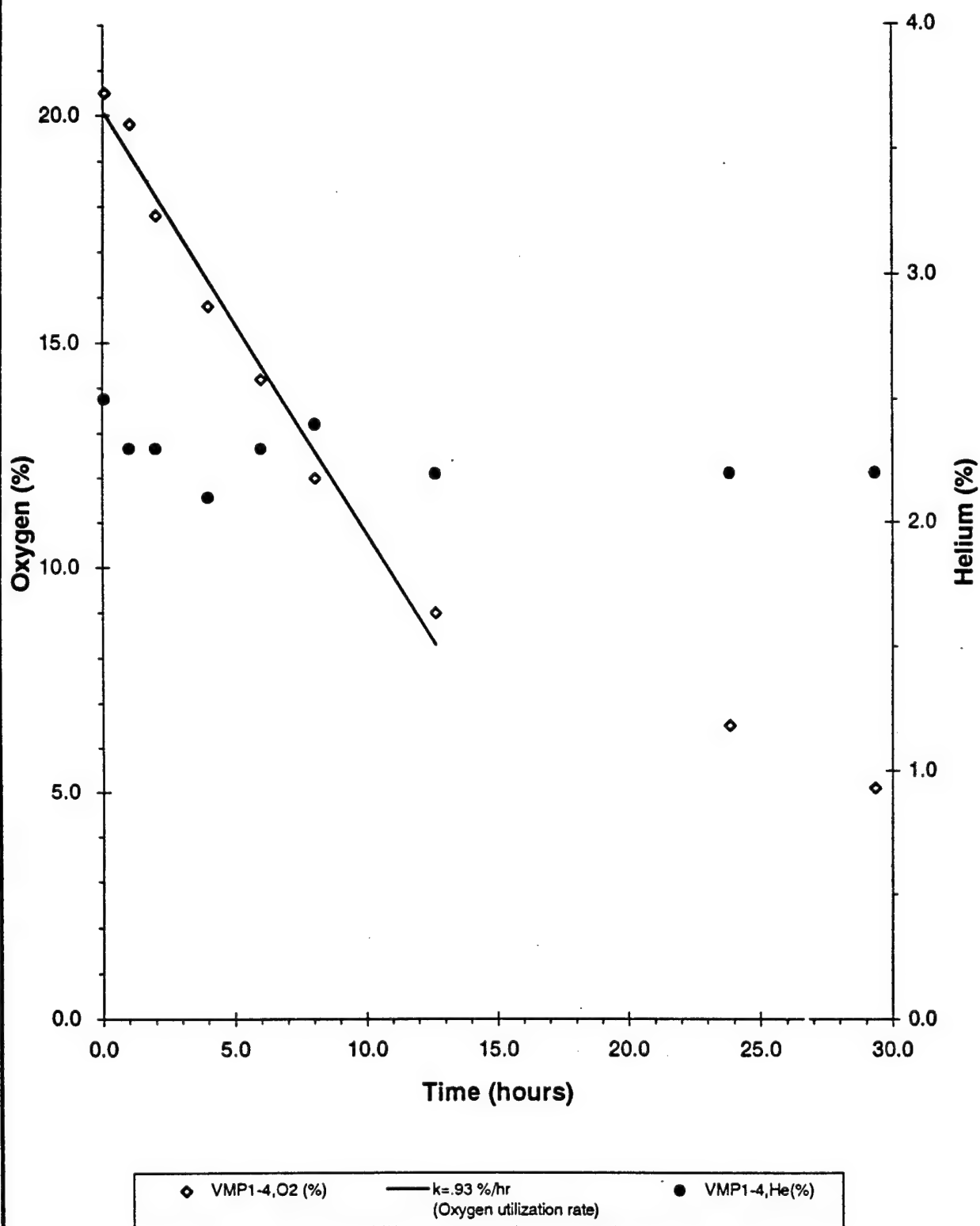
Respiration Test at VMP3-5  
PS-1B - Fairchild AFB, WA



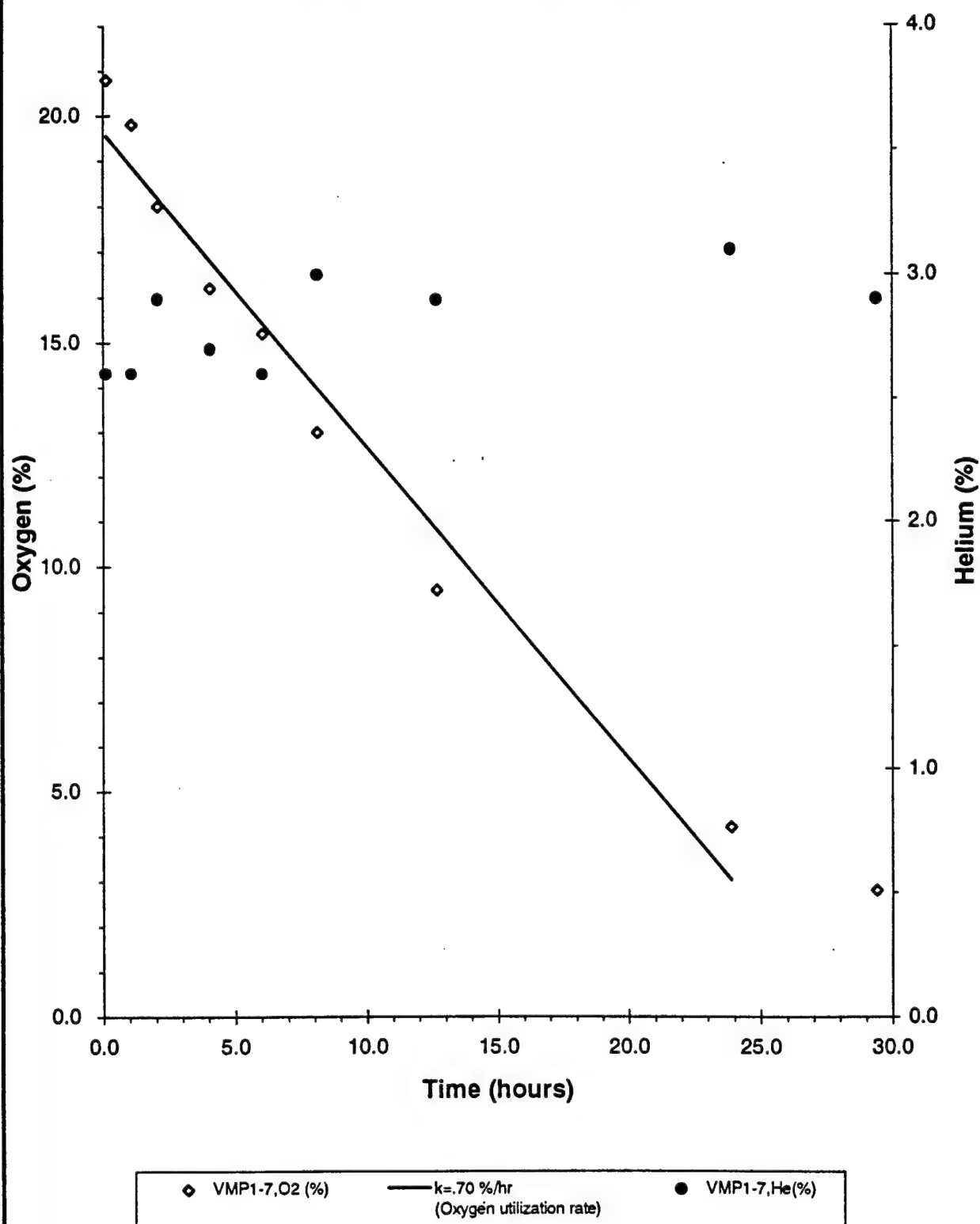
Respiration Test at VW-1  
Building 2034 - Fairchild AFB, WA



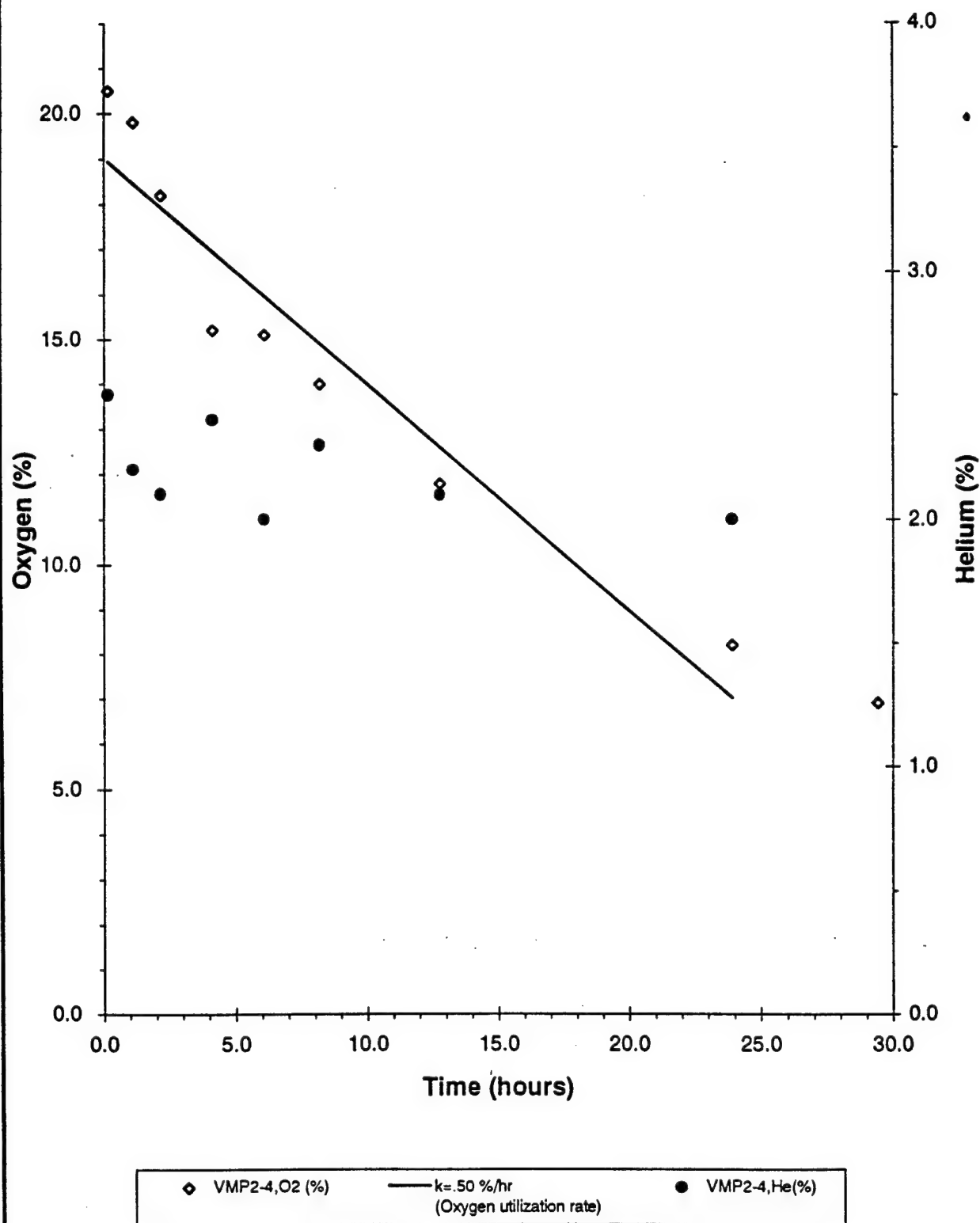
Respiration Test at VMP1-4  
Building 2034 - Fairchild AFB, WA



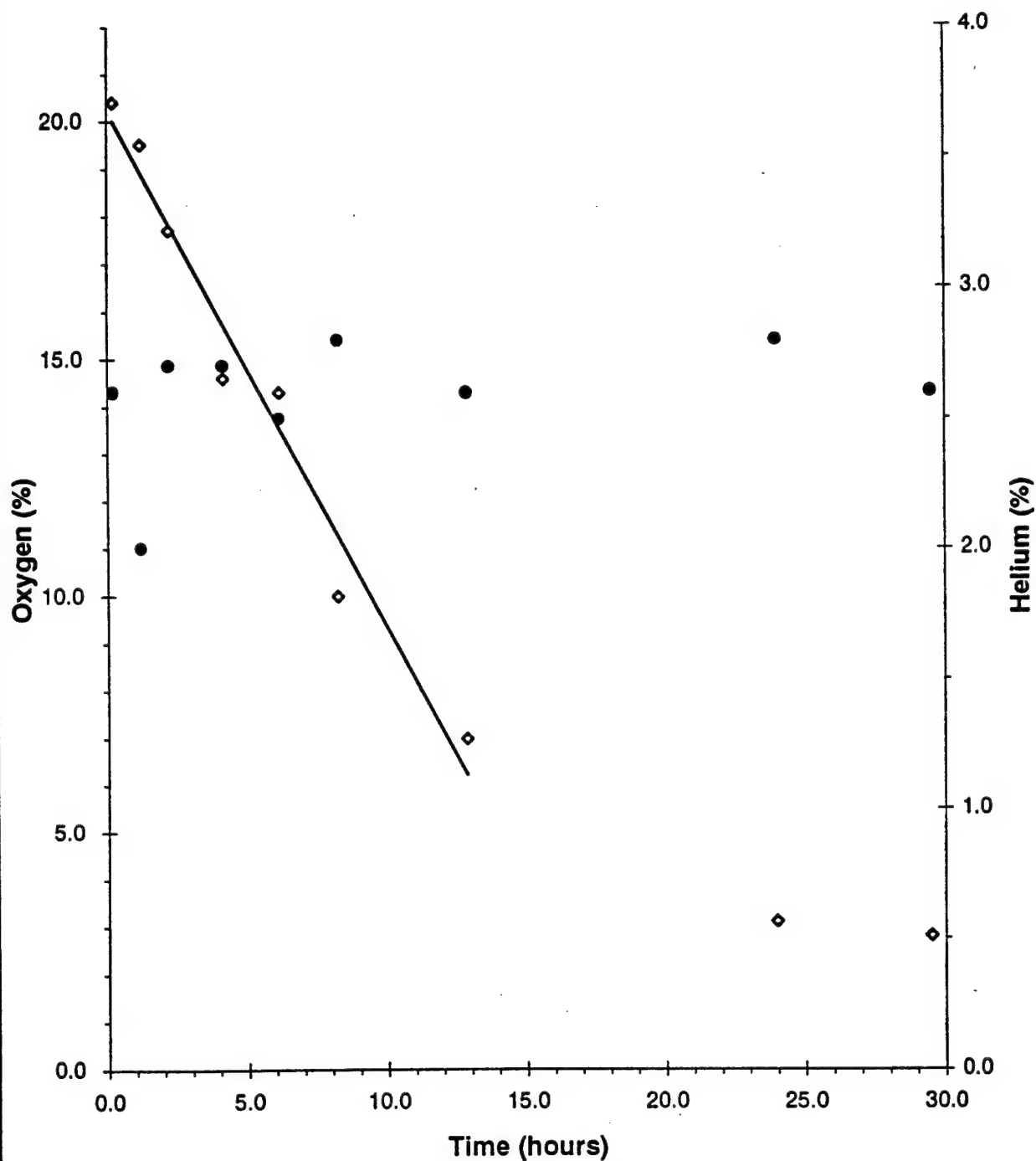
Respiration Test at VMP1-7  
Building 2034 - Fairchild AFB, WA



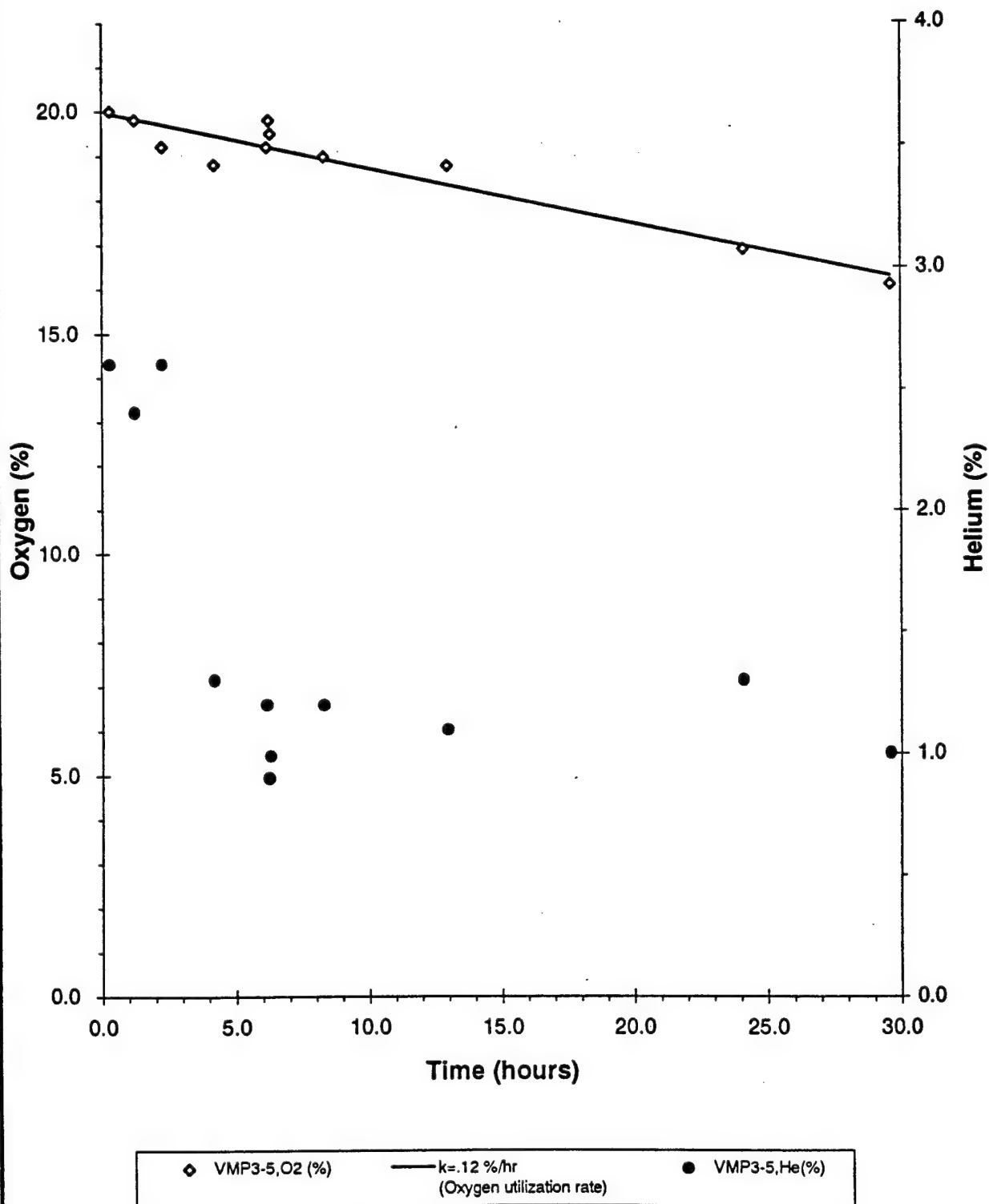
Respiration Test at VMP2-4  
Building 2034 - Fairchild AFB, WA



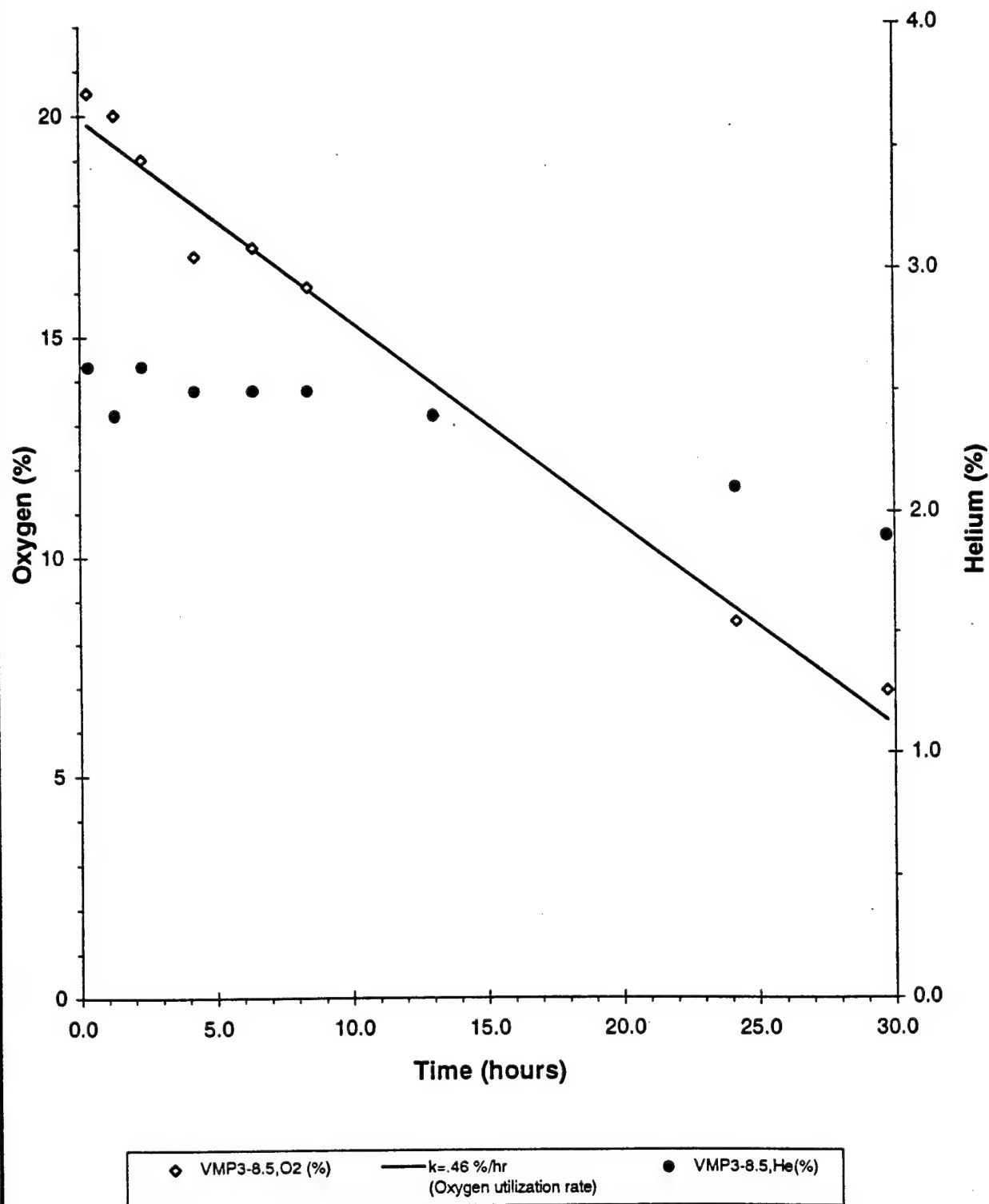
Respiration Test at VMP2-7  
Building 2034 - Fairchild AFB, WA



Respiration Test at VMP3-5  
Building 2034 - Fairchild AFB, WA

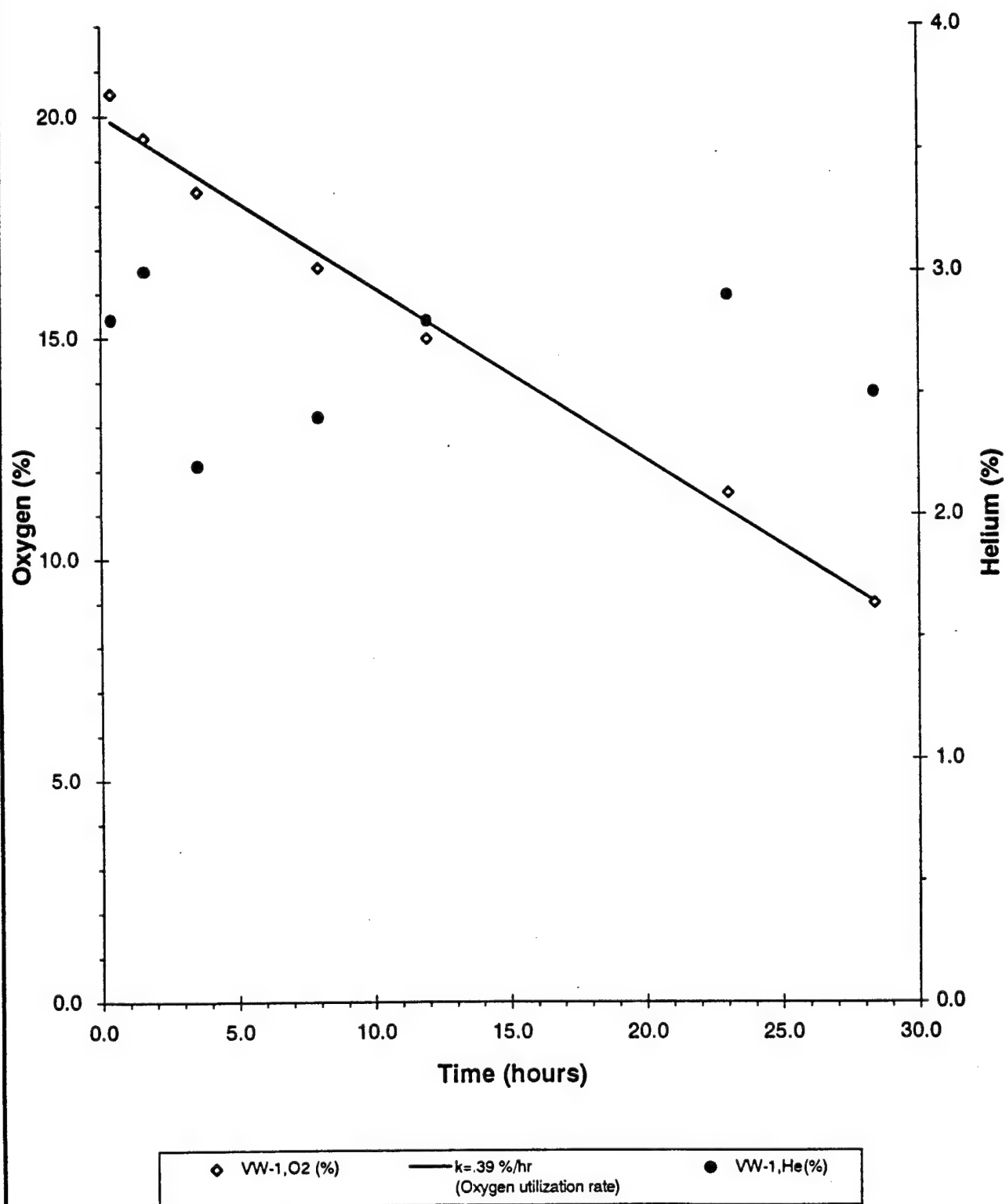


Respiration Test at VMP3-8.5  
Building 2034 - Fairchild AFB, WA

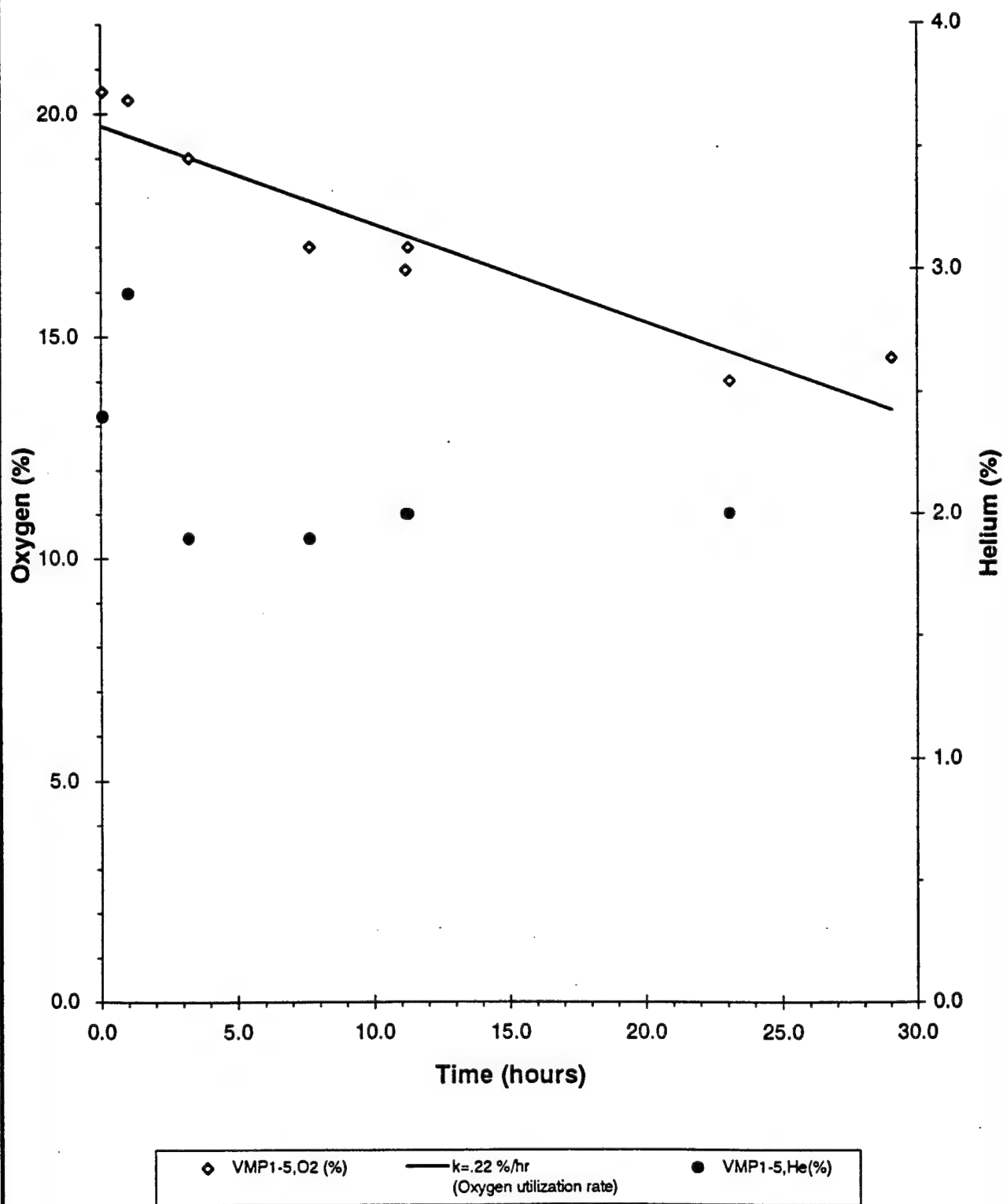




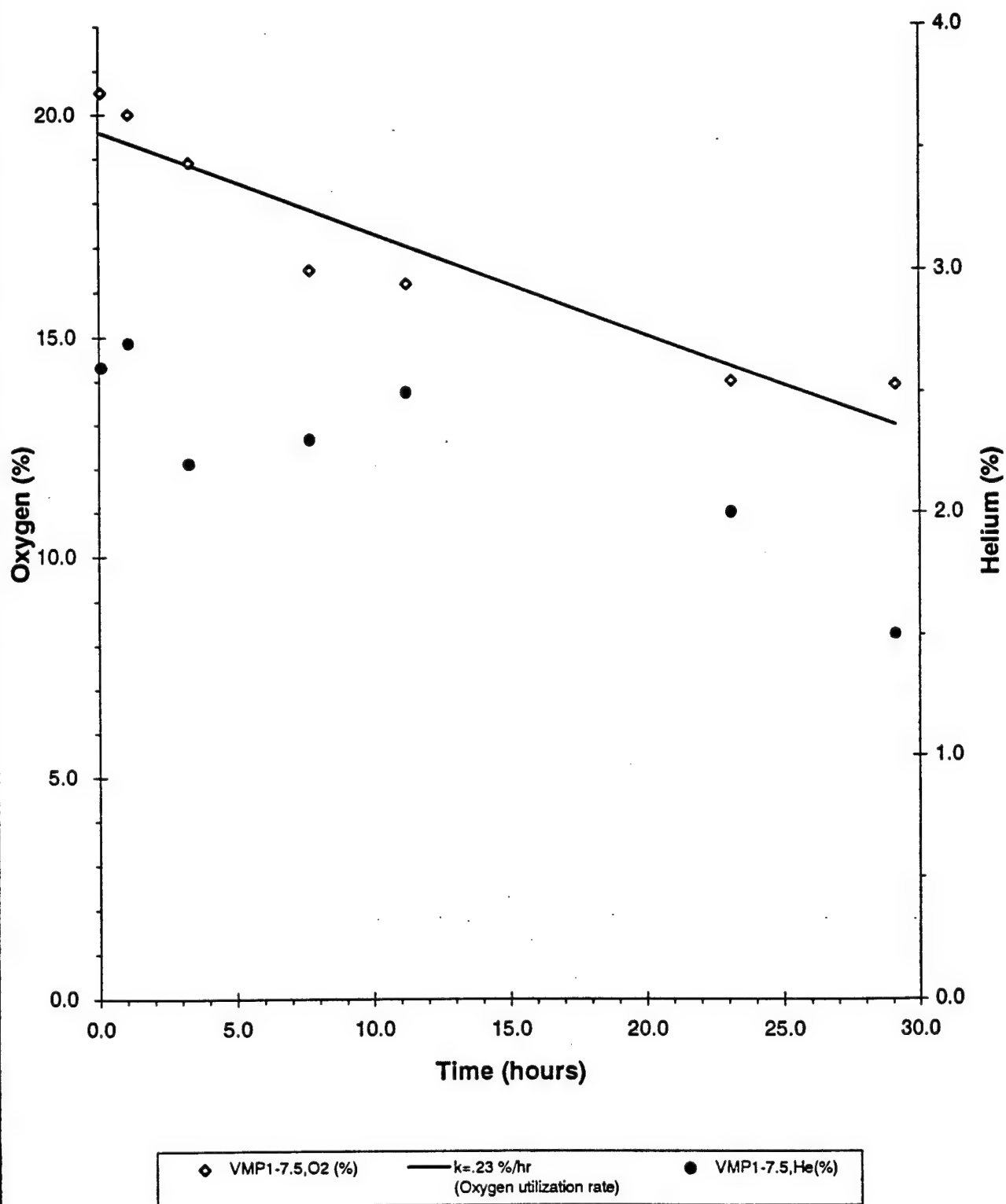
Respiration Test at VW-1  
Building 2035 - Fairchild AFB, WA



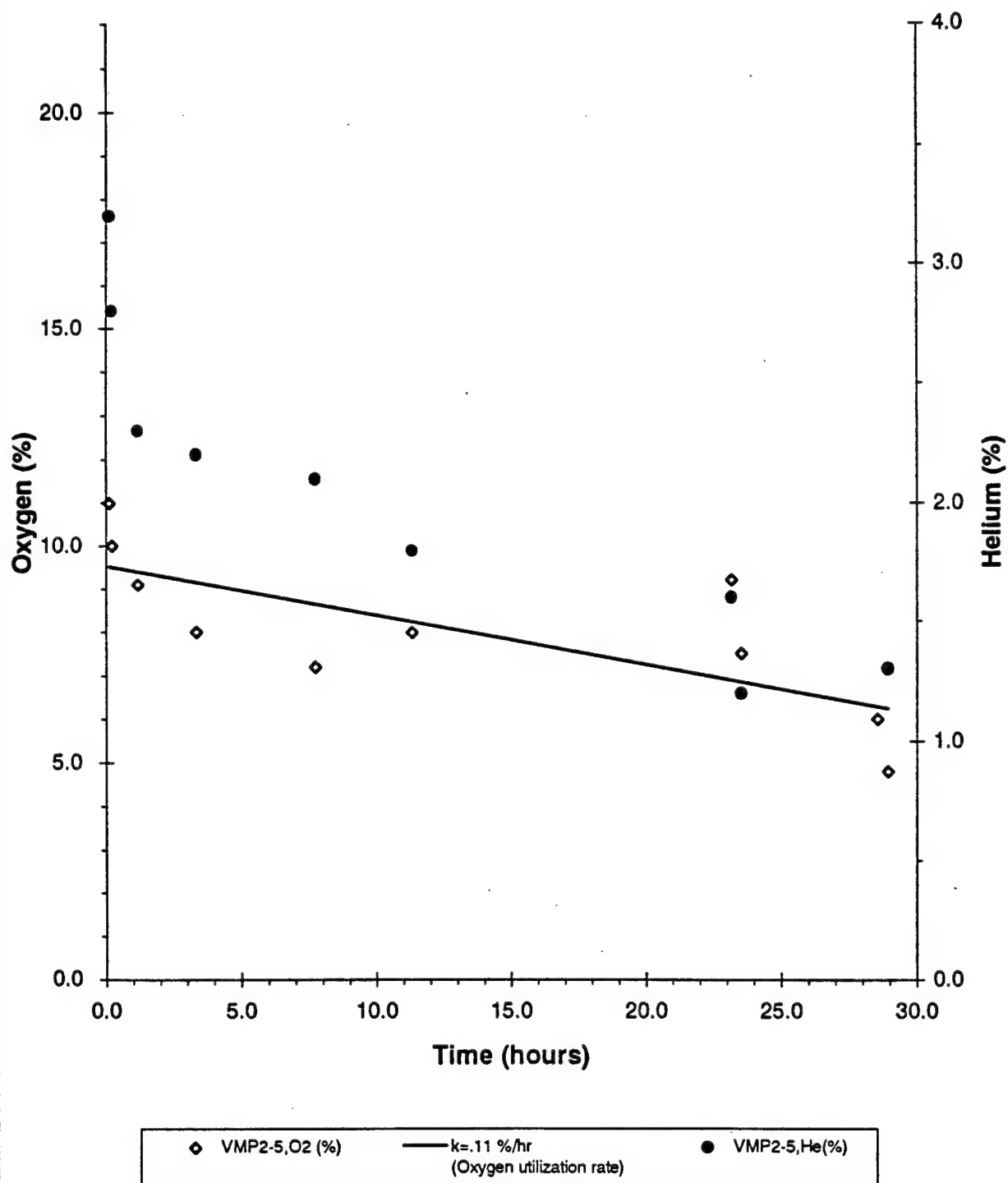
Respiration Test at VMP1-5  
Building 2035 - Fairchild AFB, WA



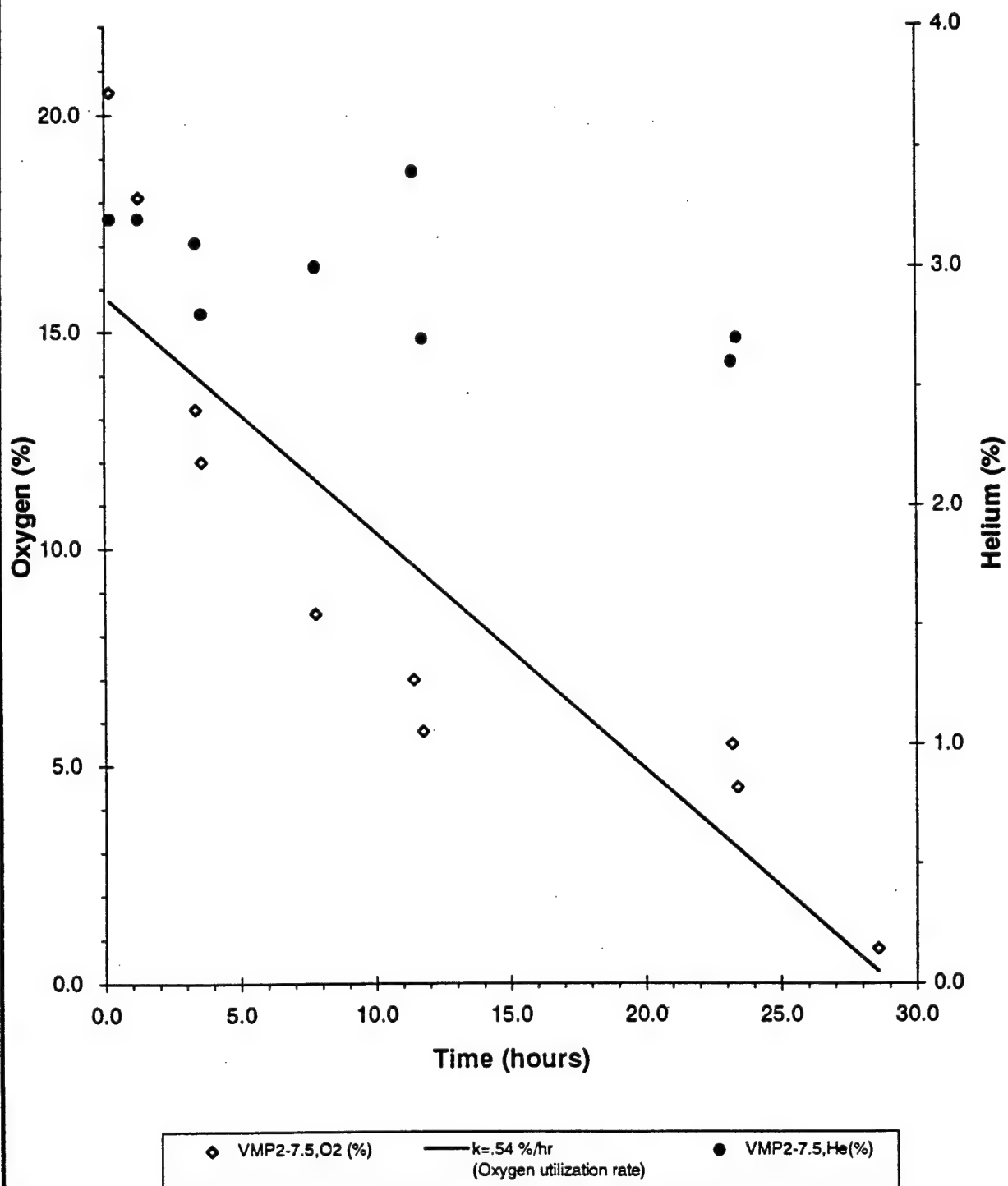
Respiration Test at VMP1-7.5  
Building 2035 - Fairchild AFB, WA



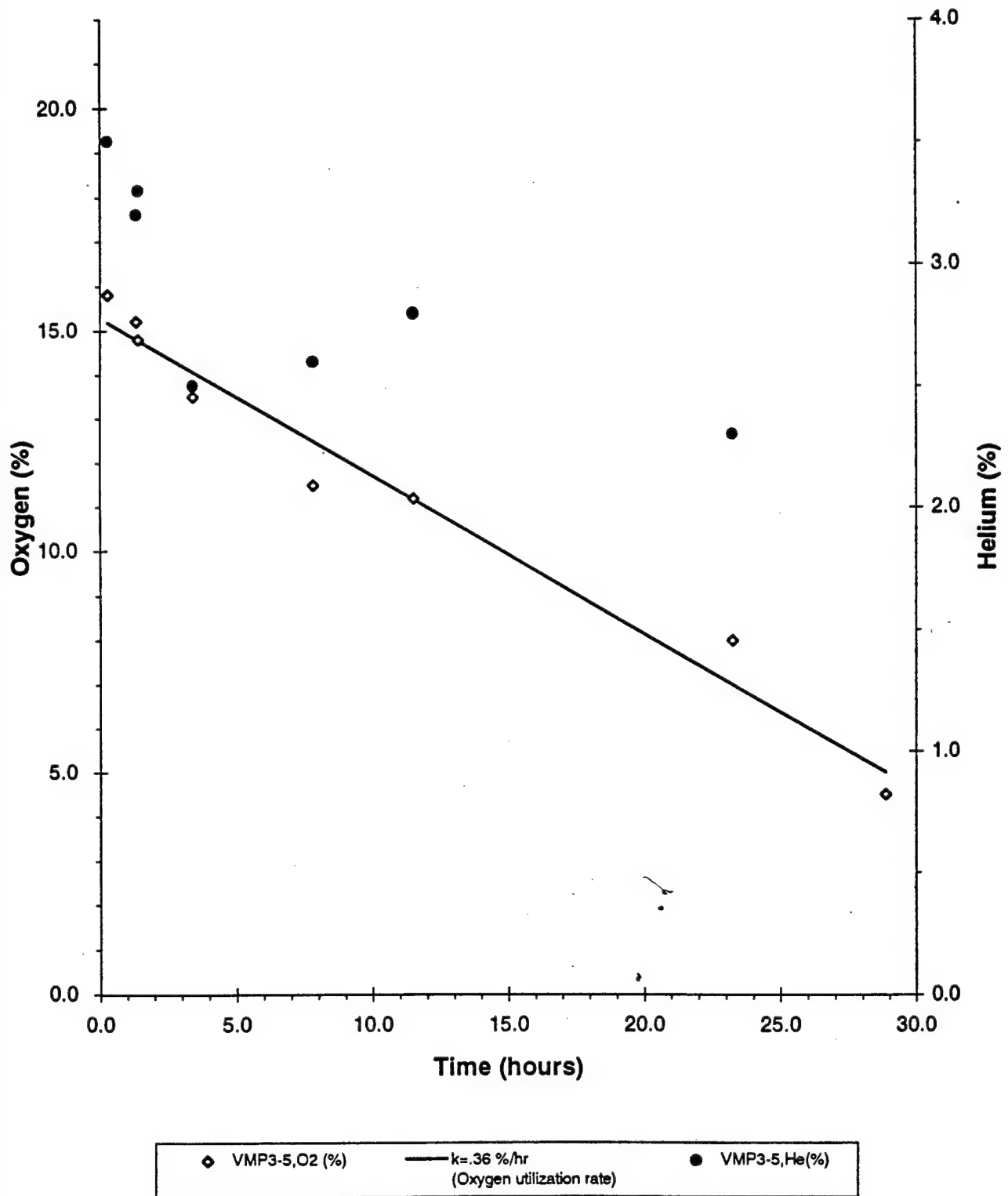
Respiration Test at VMP2-5  
Building 2035 - Fairchild AFB, WA



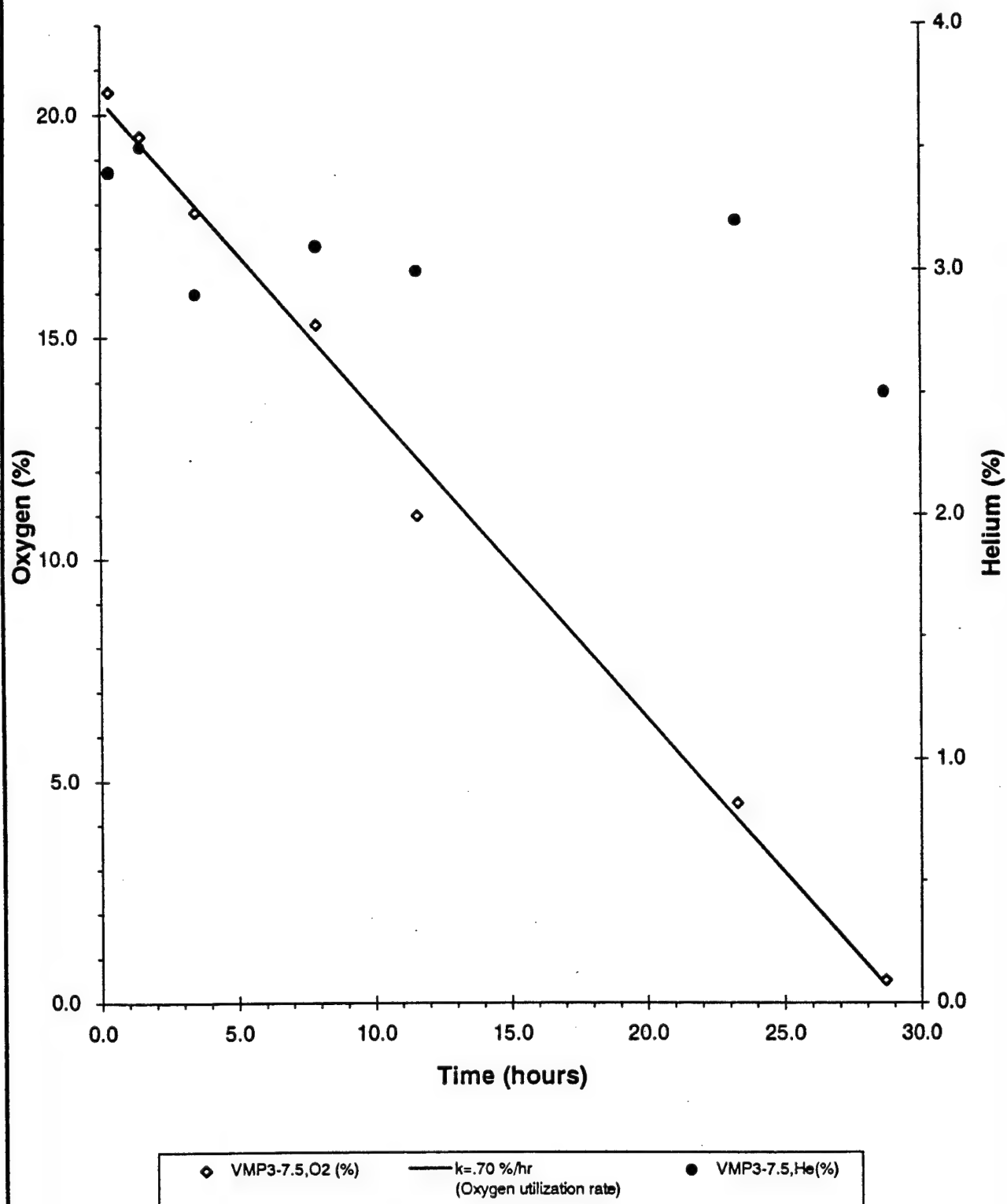
Respiration Test at VMP2-7.5  
Building 2035 - Fairchild AFB, WA



Respiration Test at VMP3-5  
Building 2035 - Fairchild AFB, WA



Respiration Test at VMP3-7.5  
Building 2035 - Fairchild AFB, WA



**APPENDIX F**

**BIODEGRADATION RATE CALCULATIONS**



**bioRxiv**

6/10/94

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Biodegradation Rate Calculations										blo.xls
Site: PS-1A										6/10/94
Location: Fairchild AFB, WA										
	VW-1	VMP1-4	VMP1-6	VMP2-3	VMP2-5.5	VMP3-5.5				
user entered data	lab		lab	lab	lab	lab				
Ko, oxygen utilization rate (%/hr)	0.37	0.79			1.40	1.80				
w, moisture content (%)	13.0%	10.0%	10.0%		6.8%	10.0%				
Soil type [from boring logs]	silty SAND/ SAND	silty SAND	SAND							
Gravel fraction (% by wt.)	3.7%	-	-		0.5%	-				
Sand fraction (% by wt.)	79.8%	-	-		54.0%	-				
Silt fraction (% by wt.)	13.3%	-	-		39.3%	-				
Clay fraction (% by wt.)	3.3%	-	-		6.2%	-				
n, Estimated porosity (-) [from soil descriptions]	0.37	0.35	0.40		0.35	0.40				
TRPH+BTEX contamination (mg/kg)	452/6,150	-	-		2,000	-				
TVH contamination (ppmv)	23,000/25,000	-	26,000		-	-				
constants										
unit weight of water (g/cm3)	1.0	1.0	1.0		1.0	1.0				
G, spec. gravity of solids (- or g/cm3)	2.65	2.65	2.65		2.65	2.65				
Do, density of oxygen (mg/L)	1340	1340	1340		1340	1340				
C, carbon/oxygen ratio	0.29	0.29	0.29		0.29	0.29				
calculated data										
volume of solids, in 1 L of soil (cm3)	0.63	0.65	0.60		0.65	0.60				
volume of voids, in 1 L of soil (cm3)	0.37	0.35	0.40		0.35	0.40				
Dry unit weight (g/cm3)	1.67	1.72	1.59		1.72	1.59				
e, void ratio (-)	0.59	0.54	0.67		0.54	0.67				
Sr, degree of saturation	0.59	0.49	0.40		0.33	0.40				
volume of water, in 1 L of soil (cm3)	0.22	0.17	0.16		0.12	0.16				
volume of air, in 1 L of soil (cm3)	0.15	0.18	0.24		0.23	0.24				
bulk density of soil (kg/L)	1.89	1.89	1.75		1.84	1.75				
A, air filled porosity (liter air/kg soil)	0.081	0.094	0.138		0.127	0.138				
Kb, biodegradation rate (mg TPH/kg soil per year)	1,010	2,490	3,700		5,940	8,320				
Notes:										
1. lab: soil sample was analyzed by analytical laboratory.										
2. Soil moisture content of 10% assumed for samples not analyzed by lab.										

Biodegradation Rate Calculations					bio.xls
Site: PS-1B					6/10/94
Location: Fairchild AFB, WA					
user entered data	VMP1-6	VMP2-3	VMP2-5.5	VMP3-5	
	lab		lab	lab	
Ko, oxygen utilization rate (%/hr)	1.1	0.073	0.16	1.0	
w, moisture content (%)	14.0%	13.0%	12.0%	13.0%	
Soil type [from boring logs]	silty SAND	silty SAND	SAND	silty SAND	
Gravel fraction (% by wt.)	0.4%	-	0.0%	3.0%	
Sand fraction (% by wt.)	44.4%	-	80.3%	62.4%	
Silt fraction (% by wt.)	41.3%	-	13.6%	27.5%	
Clay fraction (% by wt.)	13.9%	-	6.1%	7.2%	
n, Estimated porosity (-) [from soil descriptions]	0.35	0.35	0.40	0.35	
TRPH+BTEX contamination (mg/kg)	301	-	1,744	-	
TVH contamination (ppmv)	24,000/25,000	-	-	25,000	
constants					
unit weight of water (g/cm3)	1.0	1.0	1.0	1.0	
G, spec. gravity of solids (- or g/cm3)	2.65	2.65	2.65	2.65	
Do, density of oxygen (mg/L)	1340	1340	1340	1340	
C, carbon/oxygen ratio	0.29	0.29	0.29	0.29	
calculated data					
volume of solids, in 1 L of soil (cm3)	0.65	0.65	0.60	0.65	
volume of voids, in 1 L of soil (cm3)	0.35	0.35	0.40	0.35	
Dry unit weight (g/cm3)	1.72	1.72	1.59	1.72	
e, void ratio (-)	0.54	0.54	0.67	0.54	
Sr, degree of saturation	0.69	0.64	0.48	0.64	
volume of water, in 1 L of soil (cm3)	0.24	0.22	0.19	0.22	
volume of air, in 1 L of soil (cm3)	0.11	0.13	0.21	0.13	
bulk density of soil (kg/L)	1.96	1.95	1.78	1.95	
A, air filled porosity (liter air/kg soil)	0.055	0.065	0.117	0.065	
Kb, biodegradation rate (mg TPH/kg soil per year)	2,050	160	630	2,170	
Notes:					
1. lab: soil sample was analyzed by analytical laboratory.					
2. Soil moisture content of 13% assumed for samples not analyzed by lab.					

# Biodegradation Rate Calculations

Site: Bldg 2034

Location: Fairchild AFB, WA

	VW-1	VMP1-4	VMP1-7	VMP2-4	VMP2-7	VMP3-5	VMP3-8.5
	lab		lab		lab		lab
user entered data							
Ko, oxygen utilization rate (%/hr)	0.76	0.93	0.70	0.50	1.10	0.12	0.46
w, moisture content (%)	9.5%	10.0%	8.1%	10.0%	14.0%	10.0%	6.3%
Soil type [from boring logs]	silty SAND	silty SAND	silty SAND	silty SAND	silty SAND	silty SAND	gravelly CLAY
Gravel fraction (% by wt.)	8.7%	-	58.7%	-	9.0%	-	-
Sand fraction (% by wt.)	51.0%	-	33.6%	-	57.9%	-	-
Silt fraction (% by wt.)	28.9%	-	6.1%	-	25.6%	-	-
Clay fraction (% by wt.)	11.3%	-	1.6%	-	7.5%	-	-
n, Estimated porosity (-) [from soil descriptions]	0.35	0.35	0.35	0.35	0.35	0.35	0.35
TRPH+BTEX contamination (mg/kg)	1,337	-	1,257	-	3,547	-	-
TVH contamination (ppmv)	23,000	-	29,000	-	-	-	570
constants							
unit weight of water (g/cm3)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
G, spec. gravity of solids (- or g/cm3)	2.65	2.65	2.65	2.65	2.65	2.65	2.65
Do, density of oxygen (mg/L)	1340	1340	1340	1340	1340	1340	1340
C, carbon/oxygen ratio	0.29	0.29	0.29	0.29	0.29	0.29	0.29
calculated data							
volume of solids, in 1 L of soil (cm3)	0.65	0.65	0.65	0.65	0.65	0.65	0.65
volume of voids, in 1 L of soil (cm3)	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Dry unit weight (g/cm3)	1.72	1.72	1.72	1.72	1.72	1.72	1.72
e, void ratio (-)	0.54	0.54	0.54	0.54	0.54	0.54	0.54
Sr, degree of saturation	0.47	0.49	0.40	0.49	0.69	0.49	0.31
volume of water, in 1 L of soil (cm3)	0.16	0.17	0.14	0.17	0.24	0.17	0.11
volume of air, in 1 L of soil (cm3)	0.19	0.18	0.21	0.18	0.11	0.18	0.24
bulk density of soil (kg/L)	1.89	1.89	1.86	1.89	1.96	1.89	1.83
A, air filled porosity (liter air/kg soil)	0.099	0.094	0.113	0.094	0.055	0.094	0.132
Kb, biodegradation rate (mg TPH/kg soil per year)	2,520	2,930	2,650	1,570	2,050	380	2,030
Notes:							
1. lab: soil sample was analyzed by analytical laboratory.							
2. Soil moisture content of 10% assumed for samples not analyzed by lab.							

**blo.xls**

6/10/94

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